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TRANSACTIONS

OF THE

Odontological Society of Great Britain.

VOL. XXI.—NEW SERIES.

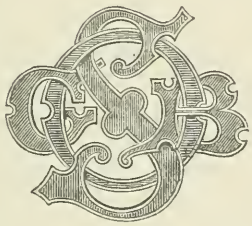
TRANSACTIONS

OF THE

ODONTOLOGICAL SOCIETY

OF

GREAT BRITAIN.



VOLUME XXI.—NEW SERIES.

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PRINTERS IN ORDINARY TO HER MAJESTY.
1889.

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1889.

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	1878	Bennett, Storer, F.R.C.S.Eng., L.R.C.P. Lond., L.D.S.Eng. 17, George Street, Hanover Square. (C. 1884, H.F.S. 1885, Curator 1886-87-88-89.)
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	1887	DAVIS, HENRY, M.R.C.S.Eng., L.S.A. 157, Gower Street, W.C.
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	Elected	
London	1882	Dowsett, George Harris. Gloucester Street, Portman Square.
	1880	Elliott, W. St. George, D.D.S., M.D., 39, Upper Brook Street, W. (C. 1884-85-86.)
	1886	England, W. J., L.D.S.Eng. 40, Wimpole Street, Cavendish Square.
	1879	Ewbank, Francis, M.R.C.S.Eng., L.S.A., L.D.S.Eng. 24, Queen Anne Street, Cavendish Square.
	1872	Fairbank, John, M.R.C.S.Eng. 18, George Street, Hanover Square. (C. 1887-88-89.)
	1883	Faulkner, John, L.D.S.Irel. 20, Mornington Crescent, N.W.
	1876	Field, W. George. 23, Park Street, Park Lane, W.
	1863	Finzi, S. L., L.D.S.Eng. 94, Oxford Gardens, N. Kensington, W.
	1856	Fletcher, John B., L.D.S.Eng. 17, New Burlington Street. (C. 1859-61, L. 1862-68, V.P. 1869-70-71, C. 1873-74. Ed Trans.) (*Honorary.*)
	1868	Flower, W. H., F.R.S., &c., Natural History Museum, Cromwell Road, S.W. (*Honorary.*)
	1860	Forsyth, W. F., L.D.S.Eng. 28, George Street, Hanover Square. (C. 1871-72-73, V.P. 1888-89.)
	1887	Fripp, Trude, L.D.S.Edin. and Irel. Station Road, Willesden Junction, N.W.
	1875	Gartley, John A., L.D.S.Eng. 5, Sackville Street.
	1874	Gibbings, Ashley, M.R.C.S.Eng., L.D.S.Eng. 18, Stratford Place. (C. 1882-83-84, L. 1889.)
	1857	Gregson, G., M.R.C.S.Eng., L.D.S.Eng. 63, Harley Street. (C. 1867-69-84, H.S. 1870-72, H.F.S. 1873, V.P. 1884-85-86.)

	Elected	
London	1874	Halliday, Middleton W., L.D.S.Eng. 4, Nottingham Street, W.
	1877	Harding, Milward. 19, Park Square East, Regent's Park.
	1867	Harding, T. Henry G., L.D.S.Eng. 19, Park Square East, Regent's Park. (H.S. 1872-73-74.)
	1883	Harris, A. Carpenter, M.R.C.S.Eng., L.D.S.Eng. 112, Harley Street, W.
	1883	Harrison, Richard, L.D.S.Eng. 245, Camden Road, N.W.
	1871	Henry, W. F., L.D.S.Eng. 79, King William Street, E.C. (C. 1880-81-82.)
	1876	Hepburn, David, L.D.S.Eng. 9, Portland Place, Cavendish Square. (H.S. 1884-85-86, C. 1887-88-89.)
	1859	Hepburn, Robert, L.D.S.Eng. 9, Portland Place, Cavendish Square. (C. 1862-66. V.P. 1867-68. P. 1869.)
	1883	Hern, William, M.R.C.S.Eng., L.D.S.Eng. 18, Stratford Place, W.
	1878	Hockley, George, L.D.S.Irel. 15, Great Marlborough Street.
	1874	Holford, John James, L.D.S.Eng. 23, Wimpole Street, Cavendish Square.
	1884	Hooper, G., L.D.S.Eng. 21, New Cavendish Street, Harley Street, W.
	1883	Humby, W. R., L.D.S.Eng. 88, Newgate Street, E.C.
	1874	Hutchinson, S. J., M.R.C.S.Eng., L.D.S.Eng. 64, Brook Street, W. (H.S. 1879-80. Curator 1881-82-83-84-85, V.P. 1886-87-88.)
	1862	Huxley, T. H., F.R.S., &c. 4, Marlborough Place, St. John's Wood, N.W. (*Honorary.*)

	Elected	
London	1856	Ibbetson, George A., F.R.C.S.Eng. L.D.S.Eng. (C. 1857-59, H.S. 1860-62, C. 1863, V.P. 1864-66, P. 1867, C. 1870-72-75-76-82-83-84.) (*Honorary.*)
	1887	Kissack, Frank H., L.D.S.Eng. 17, Bentinck Street, Manchester Square.
	1886	Kluht, Henry J., L.D.S.Glas. 44, Norfolk Terrace, Westbourne Grove, W.
	1886	Kutz, Albert, J., L.D.S.Irel. 32, Wimpole Street, Cavendish Square.
	1883	Langmore, J. W., M.D.Lond., &c. 20, Oxford Terrace, W. (*Honorary.*)
	1885	Latchmore, E., L.D.S.Eng. 14, Stratford Place, W.
	1867	Longhurst, Henry Bell, L.D.S.Eng. 28, Old Burlington Street. (C. 1877-78-79.)
	1888	Lovitt, James, L.D.S.Eng. Sandrock. 10, Well Road, Hampstead, N.W.
	1880	Maggs. W. A., L.R.C.P.Lond., M.R.C.S.Eng., L.S.A., L.D.S.Eng. 16, Hanover Square, W.
	1880	Matheson, Leonard, L.D.S.Eng. 70A Grosvenor Street, W. (C. 1889.)
	1879	May, Percy, M.R.C.S.Eng., L.D.S.Edin. 15, Endsleigh Gardens, N.W.
	1865	Medwin, Aaron George, M.D.St. And., L.R.C.P. Lond., M.R.C.S. Eng., L.S.A. L.D.S.Eng. 34, Bruton Street, Berkeley Square, W. (C. 1873-74-75.)
	1878	Merson, James, L.D.S.Eng. 28, Harley Street, W.
	1868	Mitchell, F. W., L.D.S.Eng. 176, Clapham Road, S.W.
	1888	Mitchell, Wm., D.D.S.Mich. 15, Upper Brook Street, Grosvenor Square.

	Elected	
London	1874	Mummery, John Howard, M.R.C.S.Eng., L.D.S.Eng. 10, Cavendish Place, Cavendish Square. (H.F.S. 1881-82. H.S. 1883-84, C. 1885-86, V.P. 1887-88-89.)
	1884	Murie, J., M.D.Glas., L.L.D.St.Andrew, Burlington House. (*Honorary.*)
	1883	Newton, Fredk. Harris, L.D.S.Eng. 80, Brook Street, Grosvenor Square.
	1879	Noble, Chas. J., L.D.S.Eng. 96, Cornwall Gardens, S.W.
	1861	Owen, Sir Richard, K.C.B., F.R.S. Sheen Lodge, East Sheen, S.W. (*Honorary.*)
	1876	Paget, Sir James, Bart., F.R.S., D.C.L., L.L.D., F.R.C.S.Eng. 1, Harewood Place, Hanover Square. (*Honorary.*)
	1879	Parkinson, Geo. W., M.R.C.S.Eng., L.D.S. Eng. 36, Sackville Street, W.
	1885	Parkinson, Herbert S., L.D.S.Eng. 36, Sackville Street, W.
	1856	Parkinson, James, L.D.S.Eng. 36, Sackville Street. (C.1856-57-58-59-63-72, V.P. 1865-67, P. 1868, T. 1873-74-75-76-77-78-79-80-81-82-83-84-85-86.)
	1860	Parks, William J., L.D.S.Eng. 27, Newington Crescent, Kennington Park Road.
	1887	Paterson, W. Bromfield, F.R.C.S., and L.D.S.Eng. 64, Brook Street, Grosvenor Square.
	1876	Payne, George, L.D.S.Eng. 34, Ebury Street, Pimlico.
	1882	Pedley, F. Newland, F.R.C.S.Eng., L.D.S. Eng. 32, Devonshire Place, Portland Place, W.
	1880	Pedley, George, 17 and 18, Railway Approach, London Bridge.

	Elected	
London	1885	PENFOLD, W., L.D.S.Irel. 30, York Street, Portman Square, W.
	1863	PORTER, W. P. 44, Finsbury Pavement, E.C.
	1859	PRATT. R. J. H. 2, Suffolk Place, Pall Mall.
	1859	RANDELL, E. B., M.R.C.S.Eng. L.D.S Eng. 22, Vanbrugh Park, Blackheath. (C. 1878-79.)
	1880	READ, LAURENCE, L.D.S.Eng. 18, Hanover Street, Regent Street, W.
	1882	READ, THOMAS, L.D.S.Eng. 31, Cavendish Square.
	1866	REBOUL, A. P., L.D.S.Eng. 60, Liverpool Road, Islington. (C. 1878-79.)
	1863	RICHARDSON, B. W., M.D.Lond., F.R.S., &c. 25, Manchester Square. (*Honorary.*)
	1882	ROBBINS, CORNELIUS, L.D.S. Eng. 32, Oxford Road, Kilburn.
	1886	ROBERTS, CHAS. ALFRED, L.D.S.Eng. 44, Devonshire Street, Portland Place.
	1877	ROGERS, CLAUDE, M.R.C.S.Eng., L.D.S.Eng., D.M.D.Harvard. 142, Harley Street. (H.F.S. 1883.)
	1856	ROGERS, HENRY, M.R.C.S.Eng., L.D.S.Eng. 16, Dorset Square. (C. 1872-73.)
	1856	ROGERS, THOMAS ARNOLD, M.R.C.S. Eng. L.D.S. Eng. 23, Endsleigh Street, Tavistock Square. (H.S. 1856-59, H.F.S. 1860-61, V.P. 1862-64-79-80, P. 1865-81, C. 1869-71-83-84, L. 1872-73-74-75-76-77-78, T. 1887-88-89.)
	1882	ROSE, HARRY, L.D.S.Eng. 59, Queen Anne Street, W.
	1856	SAUNDERS, Sir EDWIN, F.R.C.S.Eng. 13A, George Street, Hanover Square. (T. 1856-60, V.P. 1861-63, P. 1864-79, C. 1868-69-74-75-80-81-87-8.)

	Elected	
London	1876	Savory, William S., F.R.S., F.R.C.S.Eng. 66, Brook Street. (*Honorary.*)
	1866	Sewill, Henry E., M.R.C.S.Eng., L.D.S. Eng. 40, Wimpole Street. (H.S. 1874-75-76, C. 1877-78-79, V.P. 1885-86-87, P. 1889.)
	1877	Simmons, James J., L.D.S.Eng. 18, Burton Crescent, W.C.
	1880	Smale, Morton A., M.R.C.S.Eng., L.S.A. L.D.S.Eng. 89, Seymour Street, Hyde Park, W. (C. 1885-86-87.)
	1883	Smith, Alfred, L.D.S.Eng. 52, Parkhurst Road, Holloway, N.
	1863	Smith, J. A., L.D.S.Eng. 47, Smith Street, King's Road, Chelsea.
	1888	Stevens, Alfred, L.D.S.Edin. and Irel. No. 1, The Terrace, Park Road, Clapham, S.W.
	1874	Stocken, James, L.D.S.Eng. 21, Endsleigh Gardens, N.W. (C. 1881-82-83.)
	1877	Swanson, A. J., L.D.S.Eng. 112, Cheapside.
	1887	Sutton-Bland, John, F.R.C.S.Eng., 22, Gordon Street, Gordon Square. (*Honorary.*)
	1881	Thomson, W. Scott, M.R.C.S.Eng., L.D.S. Eng. 22, George Street, Hanover Square. (C. 1889.)
	1870	Tomes, Charles S., F.R.S., M.A.Oxon., M.R.C.S.Eng., L.D.S.Eng. 37, Cavendish Square. (Curator, 1870-71-72-73-74-75-76-77-78-79-80, V.P. 1881-82-83, C. 1884-85-89, P. 1887.)
	1856	Tomes, Sir John, F.R.S., F.R.C.S.Eng., L.D.S. Eng. Upwood Gorse, Caterham Valley, Surrey. (H.S. 1856-58, V.P. 1859-61, P. 1862-75, C. 1864-66-67-70-72.)
	1881	Truman, Chas. E., M.A Camb., M.R.C.S. Eng., L.D.S.Eng. 11, Southwick Street, Hyde Park.

	Elected	
London	1867	TURNER, J. S., M.R.C.S.Eng., L.D.S.Eng. 12, George Street. Hanover Square. (C. 1873-74-83, H.S. 1875-76-77-78, C. 1878-79-80-87-88, V.P. 1881-82, P. 1884.)
	1879	UNDERWOOD, ARTHUR S., M.R.C.S.Eng., L.D.S.Eng. 11, Bedford Square. (C. 1885-86.)
	1856	UNDERWOOD, THOMAS, L.D.S.Eng. 11, Bedford Square. (C. 1860-61-62, H.F.S. 1864-65-66, V.P. 1871, P. 1872, C. 1878-79-80.)
	1856	VASEY, CHARLES, L.F.P.S.Glas., L.D.S.Eng. 112, Cambridge Gardens, North Kensington. (C. 1862, H.S. 1863-65, C. 1867-69-75, L. 1872, V.P. 1873-74, P. 1876.) (*Honorary.*)
	1860	WALKER, JOSEPH, M.D. St. And., M.R.C.S. Eng., L.D.S.Eng. 22, Grosvenor Street. (C. 1868-71-79-82, V.P. 1880-81. P. 1883, Ed. Trans.)
	1874	WALLIS, C. J. BOYD, L.D.S.Eng. 23, Brook Street, Grosvenor Square. (C. 1886. H.F.S. 1887, H.S. 1888-89.)
	1868	WALLIS, GEORGE, L.D.S.Eng. 5, Wimpole Street, Cavendish Square. (C. 1880-81.)
	1863	WEISS, FELIX, L.D.S.Eng. 7, Montague Place, Russell Square. (C. 1865-77-78, L. 1879-80-81-82-83-84-85-86-87-88, V.P. 1889.)
	1881	WEISS, F. HENRI, L.D.S.Eng. 7, Montague Place, Russell Square.
	1881	WEISS, WILLOUGHBY, L.D.S.Eng. 7, Montague Place, Russell Square. (H.F.S. 1886, H.S. 1887-88, C. 1889.)
	1863	WEST, C., L.D.S.Eng. 19, Finsbury Square, E.C. (C. 1876-77.)
	1878	WEST, WILLIAM, L.D.S.Irel. Cyprus Villa, Lewin Road, Streatham Common, S.E.

	Elected	
London	1888	WHITE, EDWARD A., M.D., M.C.L.S.A., and L.D.S. 1, Highbury Place, N.
	1870	WHITE, T. CHARTERS, M.R.C.S.Eng., L.D.S. Eng. 32, Belgrave Road. (C. 1874-75-80-81-82, V.P. 1884-85, P. 1886.)
	1882	WILLIAMS, E. LLOYD, L.R.C.P.Lond., M.R.C.S.Eng., L.S.A., L.D.S.Eng. 2, James Street, Buckingham Gate.
	1888	WILLIAMS, HUGH LLOYD, M.R.C.S.Eng., L.D.S.Eng. 21, Huntley Street, Gower Street.
	1876	WINTERBOTTOM, AUGUSTUS, F.R.C.S.Eng., L.D.S.Eng. (C. 1884-85-86.) 16, Sloane Street.
	1886	WOODHOUSE, A. CLAYTON, M.R.C.S.Eng., L.D.S.Eng. 1, Hanover Square, W.
	1856	WOODHOUSE, ALFRED J., L.D.S.Eng. 1, Hanover Square, W. (C. 1867-79, V.P. 1877-78-79, P. 1880.)
	1876	WOODHOUSE, ROBERT H., M.R.C.S.Eng., L.S.A., L.D.S.Eng. 1, Hanover Square, W. (H.F.S. 1884, H.S. 1885-86-87, C. 1888-89.)
	1866	WOODHOUSE, WILLIAM H., L.D.S.Irel. 1, Hanover Square, W. (C. 1880-81.)
	1879	WOODRUFF, WILLIAM HERBERT, L.D.S.Eng. 13, New Burlington Street, W. (C. 1889.)
Lowestoft.....	1871	STRINGFIELD, WILLIAM, L.D.S.Irel. 30, London Road.
Macclesfield....	1882	BATES, W., L.D.S.Irel. 30, Park Green.
Maidenhead...	1859	GRIMES, S. Belmont and Nice. (*Honorary.*)
	1884	PALLANT, ARTHUR, L.D.S.Irel. Orchard House.
Maidstone ..	1888	RYMER, J. F., M.R.C.S., L.D.S.Eng. 1, Ashford Road.
Manchester	1886	CAMPION, GEO. W. G., L.D.S.Eng. 264, Oxford Road.

	Elected	
Manchester	1862	Campion, H., M.R.C.S.Eng. 264, Oxford Road. (C. 1868-69, V.P. 1876-77-78-79).
	1880	Farnsworth, Charles, L.D.S.Irel. 96, Oxford Street.
	1876	Kelly, Thomas M, L.D.S.Irel. 94, Oxford Street.
	1864	Smale, H. C., L.D.S.Eng. 118, Oxford Street.
	1858	Smith, George W., M.R.C.S.Eng., L.D.S. Eng. 6, Aytoun Street. (C. 1874-75.)
	1883	Smithard, Walter, L.D.S.Irel. 15, Stretford Road.
Middlesboro' ..	1876	Binns, Edmund, L.D.S.Eng. 70, Linthorpe Road.
Munich.....	1882	Sternfield, Alfred D., M.D. 3, Carlstrasse.
Newark	1867	King, R. F. H., L.D.S.Eng. Appleton Gate.
Newbury	1876	Mallet, Gilbert. Old Rectory.
Newcastle-on-Tyne.....	1879	Fothergill, Edward, L.D.S.Eng. 10, Eldon Square.
	1886	Markham, R. L., L.D.S.Irel. 9, Eldon Square.
New Zealand ..	1857	Coleman, Alfred, F.R.C.S.Eng., L.R.C.P. Lond., L.D.S.Eng. Nelson. (H.S. 1862-65. C. 1861-67-69, L. 1869-70, V.P. 1873-74-75, P. 1878.)
	1864	Cox, Edwin, L.D.S.Eng. Kingsley House, Hobson Street, Auckland.
	1876	Robinson, George, Eden Street, Oamaru.
Northfleet.....	1883	Lucas, George J., L.D.S.Edin. Linden Lodge, Gravesend.
Norwich	1885	Bridgman, J. B., L.D.S.Irel. St. Giles's Street.
	1876	White, R. Wentworth, M.R.C.S.Eng., L.D.S.Eng. 26, St. Giles's Street. (C 1888-89.)

	Elected	
Nottingham	1863	Bellaby, G. W., L.D.S.Irel. Park Row, Derby Road.
Oldham	1875	Wormald, T., L.D.S.Irel. 188, Union Street.
Oxford.....	1882	Bevers, Edm. Aug., M.R.C.S.Eng. L.S.A. 46, Broad Street.
	1877	Bevers, Harcourt, A. B., L.D.S.Eng. 46, Broad Street.
Penzance	1860	Magor, Martin, L.D.S.Eng. 24, Chapel Street. (C. 1882.)
Peterboro'	1859	Palmer, James Edwin. Priestgate. (C. 1881-82.)
	1886	Palmer, T. F. B., M.R.C.S.Eng. L.D.S. Eng. Priestgate.
Plymouth.....	1861	Balkwill, F. H.. L.D.S.Eng. 3, Princess Square. (C. 1886–87–88.)
	1856	Bate, Charles Spence, F.R.S., L.D.S.Eng. 8, Mulgave Place. (C. 1859, V.P. 1862-64, P. 1885.)
	1881	Jewers, Ernest E., L.D.S.Eng. 3, Athenæum Terrace.
	1860	Tubbs, C. F. 4, Athenæum Terrace.
	1874	Wells, John, L.D.S.Irel. Ringmoor Villa.
Portsmouth	1862	Martin, J. H. C., M.D.Edin., M.R.C.S.Eng., L.D.S.Eng. Cambridge House. (C. 1871-73.)
Preston	1870	Worsley, John. 63, Fishergate.
Ramsgate.....	1878	Saunders, Walter, D.D.S.Phil., L.D.S.Irel. Memel House.
Reading	1864	Petty, F., L.D.S.Eng. 10, Forbury. (C. 1875-76-77.)
Ripon	1876	Washbourn, E. Norman, L.D.S.Eng. 17, Fountains Terrace.
Ross (*Hereford*)	1883	Yates, Sidney Greatrex. Berkley House.
Salisbury.....	1886	Farebrother, H. Lloyd, L.D.S.Eng. New Street.

	Elected	
Scarborough.....	1886	Graystone, William Cass, L.D.S.Irel. 11, Valley Bridge Parade.
	1882	Mason, Charles Browne, L.D.S.Eng. 2, West Park Terrace.
Sheffield	1877	Harrison, Jos., L.D.S.Irel. Fern Bank 289, Glossop Road.
	1880	Pike, J. L. F., L.D.S.Eng. 273, Glossop Road.
Shrewsbury	1874	Harding, William E., L.D.S.Eng. 28, Castle Street. (C. 1884-85 86.)
Southampton ..	1868	Bromley, C. H., M.R.C.S.Eng., L.D.S.Eng. 1, Portland Terrace. (C. 1876-77.)
Southsea	1862	Cornelius - Wheeler, J. Fitzclarence House, Kent Road. (V.P. 1888-89.)
South Molton ..	1877	Merson, Frank. 36, East Street.
St. Leonards ..	1871	Amoore, D. W., L.D.S.Irel. 8, Warrior Sq.
	1868	Dickinson, M. de C., L.D.S.Eng. 3, Verulam Place.
Stirling	1871	Platt, Leon J., L.D.S.Edin. 64, Murray Place.
Stockton-on-Tees	1875	Wood, Maurice D., L.D.S.Irel. Whitehall Place.
Stoke-on-Trent..	1884	Forester, William, L.D.S.Glas. Clyde Villa, Temple Street, Barford.
Stroud.....	1867	Apperley, Ebenezer, L.D.S.Eng. 4, Rowcroft. (C. 1887-88-89.)
Switzerland....	1860	Kölliker, Paul Alfred. 10, Obere Zaune, Zurich. (*Corresponding.*)
Taunton	1887	Kenrick, Alfred, L.D.S.Eng. Bridge House.
Tavistock.....	1871	Brown, Richard, L.D.S.Eng. 61, West Street.
Torquay	1886	Briggs, F. H., L.D.S.Edin. 5, Park Crescent.
	1888	Helyar, Albert, L.D.S.Eng. 7, Belgrave Terrace.
	1871	Tippett, J. Collins. 14, Belgrave Terrace.

	Elected	
Tunbridge Wells	1873	Bacon, W. Beadell, L.D.S.Irel. Mount Pleasant.
Vienna.....	1876	Wedl, Karl, Prof. (*Honorary.*)
Walton - on - Thames ..	1882	Power, Thos. Henry, L.D.S.Irel.
Worcester	1865	Barkley, W., L.D.S.Eng. 47, Foregate Street.
Yarmouth, Gt...	1870	Cobb, John S., L.D.S.Eng. 28, King Street.
Yeovil	1871	Hunt, William A., L.R.C.P.Lond., M.R.C.S Eng. Pen Villa. (C. 1879-80-81.)
York	1887	Glaisby, Walter, L.D.S.Irel. 4, St. Leonards.
	1882	King, Thos. Edward, L.D.S.Eng. 17, Lendal.

ALPHABETICAL LIST OF MEMBERS.

A.

Ackery, J. . . . . London
Ackland, J. M. . . Exeter
Agnew, J. . . . . Glasgow
Alabone, A. . . . . Isle of Wight
Amoore, D. W. . . St. Leonards
Apperley, E. . . . . Stroud
Apperly, Herbt. . London
Arkövy, Dr. T. . . Hungary
Atkinson, S. . . . . Italy

B.

Bacon, W. Beadell Tunbridge Wells
Bailey, G. H. . . . . London
Baines, A. . . . . Hanley
Baker, A. J. . . . . Cosham
Baker, J. A. . . . . Dublin
Balcomb, Thos. . . Jersey
Baldwin, Harry London
Balkwill, F. H. Plymouth
Barkley, W. . . . . Worcester
Barrett, A. W. . . London
Barrett, H. J. . . London
Bartlett, Edward London
Bate, C. S. . . . . Plymouth
Bates, W. . . . . Macclesfield
Bayfield, C. M. . London
Beale, Lionel S. London
Beers, W. G. . . . . Canada
Bell, M. L. . . . . Canterbury
Bellaby, G. W. . Nottingham
Belisario, J. . . . . Australia
Bennett, F. J. . . London
Bennett, Storer. London
Betts, Ed. G. . . . . London
Bevers, E. A. . . Oxford
Bevers, H. . . . . Oxford
Binns, E. . . . . Middlesbro'
Bird, Tom . . . . . London
Bloom, M. J. . . . . Dublin
Bogue, E. A. . . . . America
Bonnell, B. J. . . . London
Braine, F. W. . . London
Brand, E. E. . . . . Exeter
Brasseur, E. . . . . France
Bridgman, F. G. . . London
Bridgman, J. B. . . Norwich
Briggs, F. H. . . . . Torquay
Bromley, C. H. . . Southampton
Brown, Richard Tavistock
Browne-Mason, J. T. . . . . Exeter
Browning, Daniel London
Brownlie, J. R. . . Glasgow
Brunton, G. . . . . Leeds
Buxton, Dudley W. . . . . London

C.

Campbell, Waltr. Dundee
Campion, Geo. G. Manchester
Campion, H. Manchester
Canton, F. London
Canton, Fred Arthur London
Carpenter, Dr. A. Croydon
Carteighe, J., Jun. London
Carter, T. S. Leeds
Cartwright, A. London
Cartwright, S. London
Cattlin, W. London
Clerk, Smollett W. India
Cobb, J. S. Great Yarmouth
Coffin, Walter. London
Cole, J. F. Ipswich
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ALFRED COLEMAN, F.R.C.S., Eng., L.R.C.P., Edin.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

November 5th, 1888.

MR. J. HOWARD MUMMERY, M.R.C.S., L.D.S.,

VICE-PRESIDENT, IN THE CHAIR.

THE Minutes of the last meeting were read and confirmed.

The following gentlemen were balloted for and elected:—MR. EDWARD A. WHITE, M.D.Edin., M.C Aber., L.S.A.Lond., L.D.S.Edin., of 1, Highbury Place N., to be a Resident Member; and MR. CHARLES F. IVES, M.D.S. New York, 62, West 35th Street, New York, U.S.A., to be a Non-resident Member.

The LIBRARIAN (MR. FELIX WEISS) stated that the usual periodicals had been received since the last meeting of the Society, viz.: the Smithsonian Report, the Calendar of the Royal College of Surgeons, the Scientific Proceedings of the Royal Society of Dublin, the Transactions of the Royal Society of Dublin, the Catalogue of the Annual Museum of the British Dental Association.

The CURATOR having no Report to present, the names of visitors were received, and the CHAIRMAN called upon the contributors of Casual Communications.

MR. STORER BENNETT stated he had for some time employed the S.S. White nerve-devitalising fibre, which contains tannin,

arsenic, opium, and creosote, and is designed to destroy pulps. This application was less painful, and as good as or even better than arsenic. Another preparation he wished to speak of was litmus paper cones, for drying out pulp canals. For fine and difficult pulp canals they were very useful; they were very thin and stiff, and so were useful for reaching narrow places difficult of access.

Mr. R. H. Woodhouse said he had employed identical nerve-devitalising fibres for some time, and had found them very serviceable. He believed Mr. Browne-Mason, of Exeter, had introduced them to the profession of this country. The fibre was especially useful where there was disease in the fang of a tooth.

Mr. Redman had also used the fibre. He found it gave less pain than the ordinary preparations. He had also found it advantageous to powder it with cocaine. Its action was quicker than other devitalisers.

Mr. Boyd Wallis said he held in his hand a model of the mouth of a young girl, aged from fourteen to fifteen years, in which a wisdom tooth was erupted. The girl had first menstruated at the age of ten. He also presented a model of the mouth of a gentleman aged about forty, in which there were no laterals in the upper jaw, and only six incisors in the lower jaw. He also showed an electric battery with a new arrangement of switchboard. The battery contains four Leclanché cells which work it to perfection. This would run for two years with very little trouble indeed. For one light a galvanometer is switched on at one end; two cells work one mallet perfectly. Each cell has a carbon rod up the centre, with a series of rods round it surrounded by a zinc column. A special feature is an arrangement on the battery box by which the cells can be reversed with the advantage that they can thus be used up equally.

Mr. Walter Coffin said it was well known that General Washington was very dependent upon the dental profession.

It might therefore be of interest to the Society to see an autograph letter from the General to his dentist, Dr. Greenwood, expressing his gratitude for skilful treatment received, and enclosing a fee.

The CHAIRMAN then called upon Mr. F. J. Bennett for his paper.

Certain Points connected with the Structure of Dentine.

By F. J. Bennett, Esq., M.R.C.S., L.D.S.

Mr. President and Gentlemen,

In one of the numerous and interesting contributions to molecular physics made by Dr. W. Ord* in March, 1885, he states that it is possible to etch or erode the surface of pieces of ivory and mother-of-pearl by immersing them for certain periods in a solution of subcarbonate of potash in glycerine.

A year previously I had attempted to extend some of the well-known experiments of Rainey on the formation and disintegration of calculi, with a view to obtaining artificial absorption and deposition in teeth and bones. Dr. Ord's paper, therefore, came as a welcome addition to my knowledge of the subject.

In order to apply this method to the dental tissues, I commenced various experiments; first, with subcarbonate of potash in glycerine, and having satisfied myself of the efficiency of this reagent, I was led to inquire, how far this action

* Read before the Royal Microscopical Society.

might extend to other carbonates. Selecting, therefore, the bicarbonate of soda as a closely-allied salt, I submitted specimens to a solution of this alkali in glycerine. At the same time, in order further to check this action, specimens were placed in pure glycerine alone. To my surprise, in both cases the specimens were acted upon, and with such similarity that I was led to conclude the real active agent in the decomposition must be glycerine alone. Since which time I have used this substance exclusively.

I wish to be understood to say merely, that all the appearances I observed in the specimens in subcarbonate of potash in glycerine I also observed in those submitted to bicarbonate of soda in glycerine, and to glycerine alone. There may at the same time have been differences in other respects which I did not observe.

My method of procedure was as follows:—

I. Freshly extracted teeth were ground and polished sufficiently thin to allow of microscopical examination; these were suspended in pure glycerine, or one of the above compounds for various periods of from one to six months, or longer; they were then washed and mounted in glycerine, for examination.

II. Freshly extracted teeth were immersed whole in pure glycerine for similar periods, then ground, polished, and mounted as before.

III. Whole teeth were placed in extremely dilute solutions of glycerine, the strength of which was daily increased until pure glycerine was used; the specimens were then kept in this for one or two months.

It is, however, with the effects of glycerine upon dentine that I propose to deal now.

Examined with the naked eye there was neither obvious loss of tissue or loss of rigidity, the chief feature being the increased translucency, almost transparency, of the dentine.

On examining one of these sections under the microscope, taken from a young tooth, longitudinal to and including the pulp cavity, but without the pulp tissue, and with a low power, no very conspicuous change was noticeable on the surface of the dentine until the margin of the pulp cavity was reached; the dentine bordering this region presented a fringed appearance and was slightly laminated. Under a higher power ($\frac{1}{4}$ in. or $\frac{1}{8}$ in.) this appearance proved to be due to the dentinal tubes in this situation having lost their surrounding intertubular tissue, which left them clearly defined, but this removal of the matrix had not completely freed the tubes; their course appearing interrupted at regular intervals by layers of membrane, having a general direction parallel to the surface of the pulp.

The layers of membrane bore a general resem-

blance to that seen in interglobular dentine; in this case, however, circular apertures, and not solid globules, occupied the surface of the membrane; oval spaces were also found between the layers of membrane.

Through these apertures could be seen the dentinal tubes crossing from one layer of the membrane to another and completely freed of their intertubular substance. As in interglobular dentine also, the tubes appeared to penetrate, or arise from the upper and under surface of the membrane. In places also the tubes distinctly arose as processes from the margins of the membrane in such a manner as to produce a strong resemblance to irregular cells and processes. A characteristic feature, moreover, was the regularity with which the tubes were measured off into short lengths by the crossing of the membrane.

The number of membranous layers thus exposed, I found to vary not so much with the time the specimen had been immersed before mounting, but rather with the length of time it had been mounted; for it was characteristic that if a drop of glycerine were added beneath the cover glass from time to time, the specimen continued to be acted upon indefinitely. In this way, fresh layers of membrane and additional lengths of tubes freed from intertubular tissue, could be brought into view.

I am of opinion, however, that in other respects

these specimens are best examined early, and that many apparently contradictory and anomalous appearances, are the result of the specimens being either mounted too long, or having been suffered to come in contact with the air, when they are apt to become distorted and unreliable.

In some places portions had become torn, bent, or completely detached; in the latter case, the tubes were always broken off in regular lengths and bounded at one or both extremities by portions of the membrane.

Again, in certain places portions of one layer of the membrane dipped down to form part of the layer beneath, and often in such a way as to include oval spaces through which the tubes could be seen stretching across as before described.

Having become familiar with the various appearances assumed by the membranous layers as seen in profile, I selected a specimen presenting to view a continuous surface of the young layer of dentine.

The section taken from the anterior fang of a lower molar, long immersed in glycerine, offered a fairly flat surface parallel to the pulp; after grinding away the pulp tissue itself, and mounting, the layers could be well studied.

In the centre of the specimen the dentinal tubes were seen directly cut across; as the sides were approached they became gradually more oblique.

Here, therefore, almost every variety was exhibited in the angle at which the membranes could be seen.

Besides the appearance of layer succeeding layer before described, over large areas scattered cells appeared to have taken the place of the membrane. These cells were seen in every variety of position, and were generally of an elongated stellate shape, tubes arising from the margins as processes and others joining the cell bodies from adjoining cells, thus presenting fragments as it were of the layers. These were best seen where the dentinal tubes were oblique in direction; from this point to where the tubes were cut directly across, there was presented a curious appearance, at first very puzzling. The uniform distribution of the dentinal tubes appeared broken by little gaps as though they had been pushed aside. A careful examination over an extended area led me to regard these apparent cells as similar in nature to those seen at the margins and other parts of the specimens, where they presented the more familiar aspect of stellate cells. The sharp well-defined margin of the cells seen elsewhere was certainly absent, still there was a strong analogy between them.

I believe those who are familiar with this curious displaced appearance of the dentinal tubes would be reminded of similar ones seen in the

fangs of teeth cut in longitudinal section to one side of the pulp cavity; in such the dentinal tubes are given off in brushes and radiate in all directions, leaving what would appear as gaps here and there. I consider they are, in this situation also, indications of the cell structures I have described.

In connection with the appearances of membranes in the region of the pulp cavity, I may remind you that long ago it was pointed out by Salter and others, that on an examination of the interior of the cap of forming dentine, where this was found thin enough for microscopical purposes, there was revealed an appearance of structure similar in its relations to interglobular layers of dentine. In these parts I found the strongest resemblance to the membranous layers I have described; in places there was in this interglobular layer also a similar resemblance to individual cells. This I regard as strong confirmatory evidence of the effect of glycerine being at least not destructive in its action, since it reveals appearances so exactly resembling natural ones.

In all the specimens I have examined which have been submitted to the action of glycerine, or either of the before-named compounds, I have never failed in finding these appearances in the dentine bordering the pulp cavity, whatever direction the section might take and so long as the primary dentine was forming.

In other parts of the dentine, away from the region of the pulp cavity, for example, where a crack had occurred, somewhat similar appearances have been seen, but hardly with sufficient constancy or clearness to make them very reliable.

From the appearances which these specimens presented, it was manifest that the glycerine had acted in a selective manner, removing certain portions of the tissue only.

Various explanations might be given for these appearances :—

First, it might be assumed that the membranes merely represented a part of the matrix itself, which possessed a greater power of resisting the action of the glycerine than the rest, a mere transitional stage or phase in the calcification of the matrix ; it might further be assumed that the surface of the membrane itself presented unequal stages of calcification, and thus also offered a variable power of resistance to the glycerine, so that portions of it had become removed, leaving behind the circular apertures.

If this were true it might fairly accord with the theory of globular calcification in dentine. The lime salts being deposited in the animal basis and aggregating into globular masses, leaving portions of the animal basis between the spheres unimpregnated with lime ; the glycerine, acting only upon those parts of the animal basis which had been

thus impregnated with lime salts, had left a membranous-looking substance with circular apertures behind.

This explanation might be even strengthened by the fact that the effect of submitting interglobular dentine to the action of glycerine, is to bring out extensively and clearly, the membranes which surround the globules, indeed, they look more like membranes with flat circular spaces.

Again, it might be considered that the glycerine had produced separation of the layers of the matrix, through the unequal expansion or contraction of certain parts. Upon this point, however, Dr. Lionel Beale, who has specially studied the action of glycerine upon the tissues, has spoken very positively; he says that all tissues, both hard and soft, neither shrink nor swell in the strongest glycerine, if only the glycerine be first diluted and gradually increased in strength. As previously mentioned, this plan has been adopted by me in my later specimens, and so far as it relates to the parts just described, the appearances have not differed in the smallest degree.

In order, however, to test the expansion of a substance almost identical in nature with the animal basis of dentine, I immersed a strip of gelatine in glycerine for some weeks, and a strip of gelatine was also immersed in water, each being one inch square. The gelatine in glycerine was found

at the end of this period of exactly the same measurement as at the beginning, that in water, however, after a similar period, having softened and swollen largely in all directions.

I think, therefore, from the general uniformity in the appearances and their resemblance to natural structures found in various parts of dentine, we should be wrong in considering them as artificial productions.

A third assumption would be to regard these appearances as evidence of cell structure; indeed, a careful and unbiased examination of the layers of membrane, will reveal in many places a distinct resemblance to irregularly shaped cells and processes, as I have before described; moreover, as will presently be shown in secondary dentine, the appearances of interglobular structure, and of cell structure, are constantly to be seen passing from one to the other without any broad or well-marked distinction. According to this view, therefore, the spaces must be regarded as intercellular in nature.

I will now proceed to describe a part of dentine where there is much variety exhibited in the degree to which calcification occurs, namely, in the calcified pulps of old teeth. Not only do the effects of glycerine show themselves well in these situations, but from the fact, which is well known, that it is possible to preserve in ground and polished specimens, both the dentine and parts of the semi-

calcified pulp, one is able to obtain specimens showing cell structure and other tissue, in sections ground and mounted directly in Canada balsam, which serve well as a standard of comparison by which to judge of the distorting effects, if any, of specimens from a similar situation, which have been submitted to the action of glycerine.

In such old teeth, the outline of the original pulp cavity is usually indicated by the abrupt termination of the regularly formed tubes of the primary dentine. This is generally succeeded by a layer of almost complete calcification. Internal to this, is the toughened and transformed pulp itself, with its offshoots passing between, and among, the calcified masses which occupy the centre of the cavity.

Wherever the pulp is in contact with the formed dentine, well defined cells are present, forming a somewhat festooned outline, and with the processes directed towards the point of calcification, these cells, which are osteodentinal cells, may be traced either as dark opaque bodies or as faint translucent ones here and there in the calcified tissue itself. The arms and offshoots of the pulp also present a reticulate structure. These appearances, which are all to be recognised in specimens which have merely been ground and mounted in Canada balsam, are seen in such but obscurely, from the obstruction which is offered by the calcified inter-

cellular substance. Similar specimens submitted to glycerine bring out these structures with great clearness, by the removal of this obscuring ground substance. The layers of cells no longer border the pulp merely, but now are seen extensively traversing the translucent area, reducing it to a cell structure which may be traced outwards until the cells and processes join the primary dentine itself. The surface of the pulp also now presents circular apertures and contours much resembling patches of interglobular dentine. These appearances, which may be constantly compared with the specimens in balsam, show not the slightest trace of distortion in any part. The effect of the glycerine being merely that of removing the calcified portions, and bringing into view the parts which underlie them.

Having thus pointed out the most obvious appearances of dentine acted on by glycerine, and the remarkable structures which it brings to light, it would be proper next to describe the appearances of specimens in which the dental pulp is also present. This, however, I will reserve for another occasion, as likewise also, the consideration of the appearances of enamel under glycerine, in order that I may add a word with regard to the effects of this reagent on the cementum.

This tissue, as is natural from its containing the smallest proportion of lime salts of any of the hard

structures of the teeth, was the one most completely affected by glycerine, so thoroughly, indeed, that almost every trace of it could be removed by absorption. The naked eye appearances also, were more marked in this tissue under glycerine or its compounds than elsewhere. Whole teeth, which had been immersed for some months, presented a dark, dead appearance, sometimes with irregular whitish opaque patches, which resembled the porous light coloured cementum affected with chronic inflammation, and were doubtless indicative of a loss of density. The absorption, however, was usually most visible in specimens which had been ground and mounted for some time.

Microscopically examined, the irregular outline when it occurred marked the extent of the loss of substance. In some cases absorption showed no disposition to follow the order of its deposition in layers, removing the whole of one layer, that is to say, before proceeding to the next. It appeared, however, generally to commence at the peripheral margin; in some specimens also the manner appeared such as to assume the gnawed and bitten appearance of natural absorption.

Usually the lacunæ were clearly and sharply defined, often appearing to stand somewhat in relief, as though the surface of the surrounding matrix had been slightly removed. The form of the lacunæ was often found to undergo no change

in shape, even at the point where they disappeared in the surrounding absorption. In certain cases, however, different parts of the interior appeared to be simultaneously attacked by absorption, in which case the appearance of channels, not unlike those found in natural absorption, were present, in the neighbourhood of which, and closely connected with them, were very large lacunæ. The canaliculi and their finer branches could be traced to a greater distance than is usual in ordinary specimens.

Briefly to summarize the results of this investigation, first, it has established the fact that glycerine is capable under certain conditions of decomposing the hard tissues of the teeth, and that it probably does so by the removal of the intercellular substance or matrix, where it exists in a certain state of density. Thus in the cementum, the least dense of the three tissues, it is most active, the cells being loosely united are unable to hold together, and disappear with the surrounding decalcification. In the dentine, a tissue which there is reason to believe increases in density in the order of its deposition, the younger layers are chiefly affected. In this situation the dentinal tubes are left standing, partly from their rigidity, and partly from the support afforded by the membranes or layers of cells.

I need hardly point out, in conclusion, that beyond furnishing us with a new and valuable

reagent wherewith to study the tissues, and furnish fresh data from which to reconsider certain points in the structure of dentine and cement, there is that other aspect, in which glycerine, from the manner of its absorption of the tissues artificially, may lead a step onwards, to a better understanding of complex and hidden methods employed by Nature herself.

Discussion.

The Chairman felt the paper to which they had listened with so much interest opened a wide region for thought. As Dr. Ord was present at the meeting, he hoped he would open the discussion.

Dr. Miller Ord said he rose in obedience to the request from the Chair, and desired first to express his congratulations to Mr. Bennett upon the ability and suggestiveness of the paper. In the commencement of it, Mr. Bennett had referred to some papers of Dr. Ord's, as bearing, from his point of view, upon his researches. These were scattered papers and covered a good deal of ground. It happened some two or three years ago that Surgeon-Major Bidie—now Sanitary Commissioner—wrote a letter to *Nature* stating that he had observed that certain glass vessels upon which white ants' mud had been deposited, became etched over that portion which had been covered, and asking whether any acid existed in the secretions of these ants capable of acting upon glass. It was known to Dr. Ord, from his long association with Mr. George Rainey, that he had observed that glass surfaces were eroded when exposed to the action of carbonate of lime deposited in the presence of a colloid. He had shown that a perfectly clean and smooth glass slide, after being placed for a time in a solution of gum in the presence of carbonate of lime, became quite dim, and was eaten out into little shallow round depressions. When carbonate of lime was deposited in gum it was seen, instead of taking the usual form of a rhombohedral crystal, to take a spherical shape, and he demonstrated that the colloid annulling the polarities of crystallisation, allowed simple attraction to work unhindered, so that where there should be a crystal with plane surfaces

and sharp edges, we got a sphere. Where a colloid was formed on the surface of the glass it drew away molecule after molecule from the glass into itself, which formed a little bed for itself in the shape of a slight hemispherical depression. Dr. Miller Ord repeated Mr. Rainey's experiments, using gum, albumen, and glycerine and albumen together, and after some length of time he obtained specimens much more remarkable than Mr. Rainey's, simply owing to the long exposure in the presence of colloid and a perfectly neutral salt. It then occurred to Dr. Ord to try ivory and mother-of-pearl in a parallel series. With glass he used glycerine and nascent carbonate of lime, with ivory and mother-of-pearl, carbonate of soda and glycerine, although in some experiments no carbonate of lime was used and yet marked etching was obtained. That raised a question of a different sort, and it might be said that these were not acted upon by carbonate of potash, or carbonate of soda without glycerine. What he (Dr. Ord) believed to be the explanation was, that whereas in the glass the etching had come about by "molecular coalescence," in the last case we had an instance of "molecular disintegration." By "molecular coalescence" Mr. Rainey meant the condition which occurred when he found spheres of carbonate of lime in gum, and that any two or more spheres coming into contact with one another gradually coalesced into one perfect sphere. When such spheres—really little pearls—were placed in a fresh solution of gum, they underwent dissolution, the earthy matter being drawn out of them, leaving a "ghostly" sphere of the organic matrix, and this Mr. Rainey called "molecular disintegration." The contact of the glycerine and carbonate of potash with the surface of the ivory or mother-of-pearl introduced a new colloid, and it would in like manner disturb the original arrangement, drawing out the earthy matter and leaving the matrix behind. In this way Dr. Ord explained the appearances obtained. Mr. Bennett had, in his experiments, eliminated the carbonates and dealt only with the glycerine. It was very interesting to notice that in proportion as the structure was less compact he had more readily withdrawn the earthy material from its

organic matrix, and where the organic matrix was more completely formed, and more completely solid, he had left the organic matrix well preserved, almost as if he had dissolved the earthy matter with an acid. Referring to the cells he (Dr. Ord) could not express an opinion except that they might be a rearrangement of the earthy matter. Mr. Bennett appeared, he thought, to have hit upon something quite new which might prove of great value in such researches as those he was pursuing. He seemed able to withdraw from solid teeth the inorganic without disturbing the organic matter. This, at least to Dr. Ord, appeared to be the explanation of Mr. Bennett's interesting results. Dr. Ord said he could not say more until the specimens had been examined by polarized light to see whether the cells were organic spheroids or inorganic matter.

Mr. Stocken asked whether Mr. Bennett had been careful to examine the glycerine he used, as ordinary glycerine sometimes generates an acid if kept.

Mr. Fairbank asked what Mr. Bennett considered was the true nature of the cellular structures or those portions of tubes he described. Whether they are simply the original cells, and that the membranous layers in between these apparently cellular layers are the remains connecting the membrane which would connect the cells together and so form dentinal tubes ?

Mr. Hunt asked what was the date of Mr. Rainey's experiments.

Mr. Walter H. Coffin said apart from the physiological and anatomical interest, which was great, Mr. Bennett's investigation suggested an extension of the dissolving powers of glycerine. It seemed to rank with alcohol and water, like the trinity of the old alchemists; and it would appear that its dissolving powers were not quite yet exhausted, and that we had more to learn about it.

Mr. Storer Bennett said, without being actively engaged on the experiments narrated in the paper, he was himself

able to bear testimony to the very great care that had been devoted to them, and therefore he thought that if it were ever right to accept the results of scientific experiments on trust, there was in the present case a certain justification for accepting them as true, as far as they go, until they were disproved. He wished to emphasize the point to which Mr. Coffin had referred, viz., the remarkable properties which glycerine seemed to possess, although originally merely a bye-product in the manufacture of soap. As to the explanation which Mr. F. J. Bennett offers about the tubes and membranes, that might be accepted or not, but there could be no doubt that the appearances described were easily seen under a microscope, although of course the correctness of the inferences drawn from them could only be proved by further investigation.

Mr. Betts suggested that perhaps it might be possible that the investigation which Mr. Bennett had undertaken, might lead to some discovery with regard to erosion, since acids as well as fats were very apt to lodge in the gums.

Mr. Hern desired to ask whether Mr. Bennett had experimented with the action of acids upon the tissues, and compared the results with those obtained in his glycerine solution experiments.

Mr. F. J. Bennett, in replying, said he had no doubt in his own mind that the appearances he had described were not due to a rearrangement of earthy material. There was undoubted proof that it really represented a natural structure which had not been hitherto recognised. We know similar examples in interglobular spaces, and in other instances. Salter said if the inside cap of young forming dentine were examined, it would be found to possess a cellular appearance, very much like that of interglobular dentine, and the appearance in his (Mr. Bennett's) specimens were very similar. With reference to polarized light, he had already submitted his specimens to it, and there could be no doubt that they were calcified structures. He thought that persons interested in the subject under discussion could not do better

than read Dr. Ord's papers, which were more interesting and formed a sort of second chapter to the leading work on the subject. Mr. Rainey's researches were published about 1858. Replying to Mr. Stocken, he (Mr. Bennett) had not in his present research paid any regard to the question of the acidity of the glycerine, as he had obtained certain results, and had striven to follow these up, using the same (the common) glycerine. He proposed, however, using Price's glycerine upon a subsequent occasion. Mr. Fairbank had asked to what particular part the cellular substance belonged, but that branch of the investigation he proposed to leave for the present; he might add that he believed them to be *bonâ-fide* dentinal cells. In reply to Mr. Betts, he had to say he had submitted specimens of erosion to glycerine, but so far they had not behaved as they should have done. In response to Mr. Hern, Mr. Bennett said he had never seen any changes produced in dental tissue which in any way resembled those he had shown that evening, except when treated in the way described. He had in some cases submitted teeth to the action of glycerine, then decalcified them in chromic or hydrochloric acid, but there was no resemblance between specimens under the action of glycerine and those under the acids.

The Chairman, having put the usual vote of thanks to contributors, announced that the next meeting of the Society would take place on Monday, December 3rd, when a Casual Communication would be made by Mr. J. Bland Sutton, F.R.C.S., on "Some Congenital Pharyngeal Tumours," and a paper would be read by Dr. Wm. Mitchell on "Some Suggestions on Metal Cap Crowns."

The Society then adjourned.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

December 3rd, 1888.

MR. S. J. HUTCHINSON, M.R.C.S., L.D.S.,

Vice-President, in the Chair.

The Minutes of the previous meeting having been read and confirmed,

Mr. Edward A. White, M.D.Edin., M.C.Aber., L.D.S.Edin., L.S.A., of 1, Highbury Place, N., having signed the Obligation Book, was formally admitted to membership by the Chairman.

Mr. J. W. Shillcock, L.D.S.Ire., of 1, Rue Bössu, Cannes, France, was balloted for and elected a non-resident Member of the Society.

The Librarian (Mr. Felix Weiss) announced that a work, "L'Art Dentaire," by Dr. Kühn, had been received and added to the Society's Library.

The Curator (Mr. Storer Bennett) presented to the Museum the skull of a Paca (*Cœlogenys paca*), a rodent of which there was no example in the Society's collection. It would be noticed how enormously developed were the zygomatic arches, being produced to such an extent as to com-

pletely hide the molars of the lower jaw when the maxillæ were articulated. The zygomatic enlargements were seen to be hollowed out internally so as to form a large cavity on each side, lined by mucous membrane, and communicating with the mouth by a small opening. The function of the cavities, however, was unknown, unless it was to lighten what would otherwise be a very heavy mass of osseous tissue, in a similar manner to that in which the antra of Highmore, the sphenoidal sinuses, &c., acted in the human subject.

The CHAIRMAN then called upon Mr. Bland Sutton for his communication.

On some Congenital Pharyngeal Tumours.

By J. Bland Sutton, F.R.C.S.,
Honorary Member of the Society.

In 1887 Dr Walker exhibited before this Society the head of a calf, which presented, in addition to a cleft involving the soft and greater part of the hard palate, a median fissure of the lower lip and symphysis; the tongue was bifid at the apex.

This head has since been dissected and described in detail by Professor Windle,* who found that the fissures were caused by a tumour connected with the under surface of the basi-sphenoid, and projected downwards into the mouth to be attached to the mandible. This tumour was connected by a long pedicle to the floor of the pituitary fossa; the floor of the fossa presented a deep pit immediately above the point of attachment of the pedicle, but did not apparently extend into it. The tumour was composed of two pieces of bone united by ligament; parts of this bone were of ivory-like density, and contained two molariform teeth. The general characters of the tumour are shown in the accompanying drawing, Fig. 1.

Some similar specimens have recently come under my notice, and as they lead to conclusions of some interest, I have ventured to bring descriptions of them under the notice of the Society.

* Journal of Anatomy and Physiology, vol. xxii, p. 423.

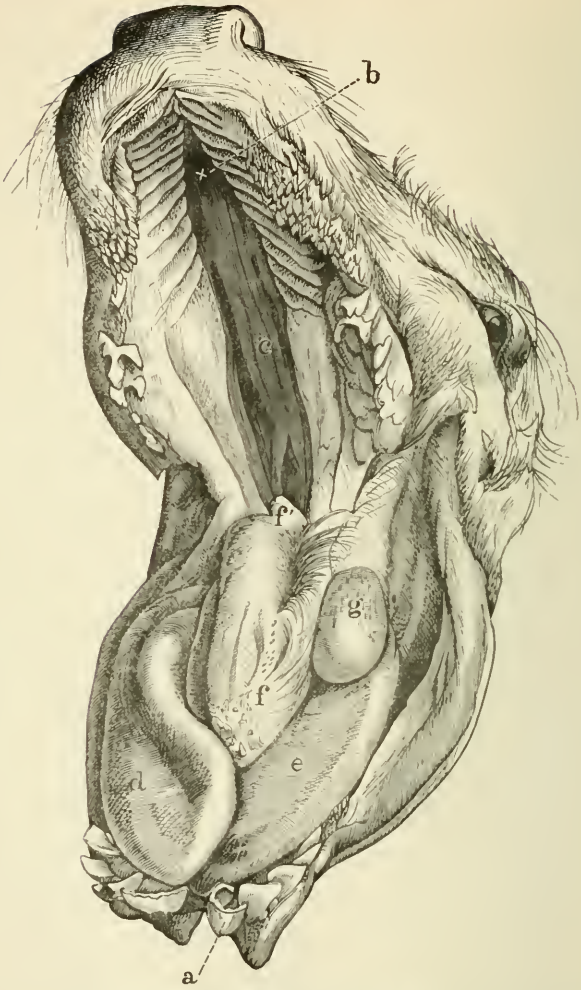

Fig. 1.—Calf's head with basi-cranial teratoma. The mouth is represented widely opened. *b* the cleft in the palate; *d*, *e*, the tongues; *a*, supernumerary tooth; *f*, *f*, and *g*, the teratoma.*

* From an etching kindly placed at my disposal by Professor Windle.

For my first specimen I am indebted to Mr. Wilson and Dr. Job Collins. It is the head of a foal with a median hare-lip and cleft palate. I immediately suspected that it was caused by a teratoma: a median sagittal section was made of the head, and a remarkable tumour was found wedged in between the superior maxillæ. This tumour was of irregular oval shape, and suspended

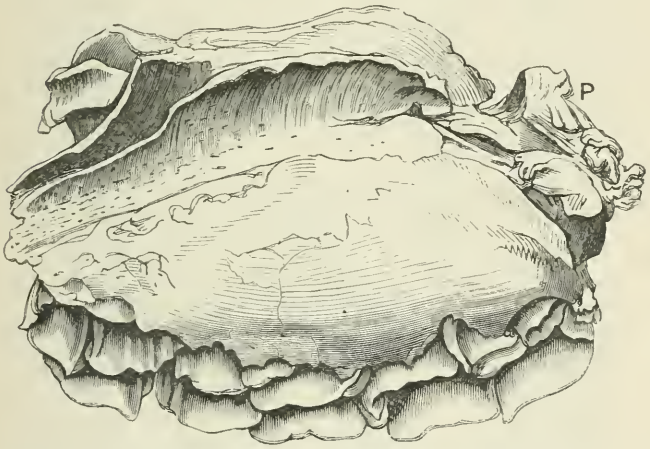

Fig. 2.—Teratoma from a foal. The superior maxilla. *P*, the pedicle.

from the under surface of the basi-sphenoid by means of a pedicle formed of striped muscle and fibrous tissue. The tumour consisted of two parts, which for convenience may be referred to as upper and lower. The upper one had some resemblance to a superior maxilla, and presented three well-formed molar teeth, the parts, including the teeth,

were covered by thick mucous membrane. The lower piece was made up of two mandibles fused throughout their length, and presented

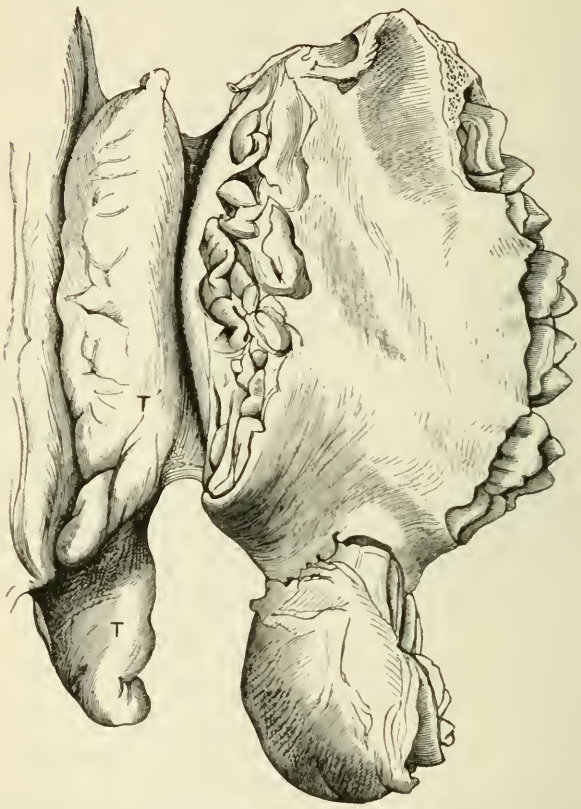

Fig. 3.—The fused mandibles with the accessory tongue *T'*, and the normal tongue *T*.
(These parts are of nearly natural size.)

on each side three well-formed molar teeth. The parts were covered with mucous membrane.

Attached to the right side of the lower piece was a tongue attached at its anterior extremity to the normal tongue of the foal.

Thus it will be seen, on referring to Figs. 2 and 3, this tumour consisted of a supernumerary upper maxilla, two rudimentary mandibles, and an extra tongue attached to the under surface of the basi-sphenoid. Unfortunately the brain was not in a condition to allow of its accurate dissection: this is regrettable, because an examination of the skull-base reveals a remarkable condition. The view from the interior of the cranium is shown in Fig. 4, where it will be seen that the pituitary body is double, the sellæ being separated widely. There are two cristæ gallæ and two cribriform plates; each lodged olfactory lobes, so that this foal possessed four sets of olfactory nerves. The aperture, marked T in the drawing, accommodated the pedicle which supported the teratoma.

My next specimen occurred in a pig. This pig had two bodies, each with limbs normal in number. The head was single, and presented posteriorly a meningocele, which communicated with the sub-dural space by a rounded opening in the anterior fontanelle, Fig. 5. The snout of this pig presented three narial apertures, Fig. 6; the palate had two clefts and a bifid tongue. The œsophagus was single and led into a stomach common to the two pigs. Each pig had its own large and small intes-

tine. The pigs were males, and the genito-urinary organs were quite distinct. Two larynges were present, separated from each other by the œso-

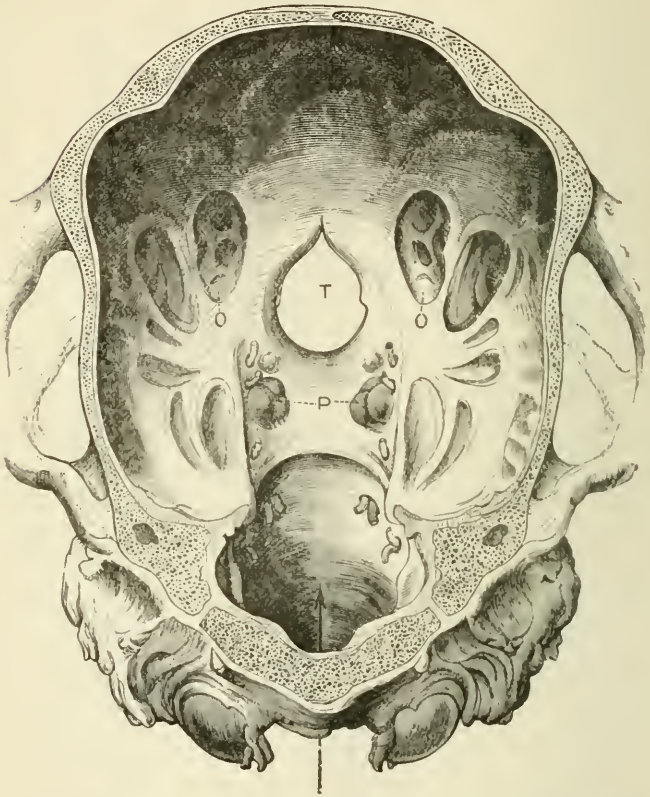

Fig. 4.—Interior of the cranium of a foal. *P*, pituitary bodies. The arrow lies in the foramen magnum; *O*, *O*, Olfactory fossæ.

phagus. On splitting the symphysis menti and separating the parts for the purpose of finding the

missing mandibles, I found a tumour hanging by a pedicle from the under surface of the basi-sphenoid, consisting of two mandibles fused together, covered with mucous membrane, presenting hairs, and

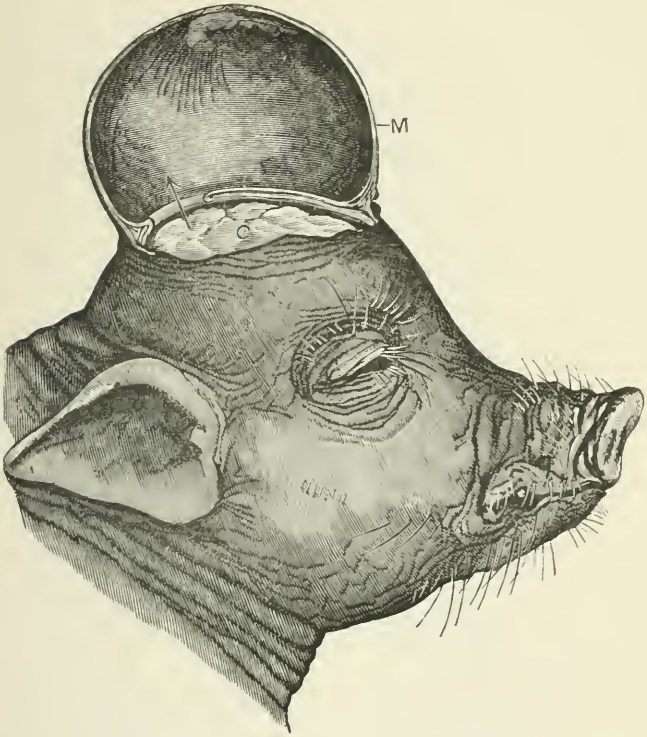

Fig. 5.—Side view of the pig's head with the meningocele. *C*, the cerebrum.

beset along the outer margins with teeth which had been erupted. On removing this tumour a second but much smaller pedunculated body was found independently attached to the palate as

shown in Fig. 6. This little pedunculated body is, as a matter of fact, of quite as much importance as the larger mass beside which it hangs, and we shall consider it more in detail subsequently.

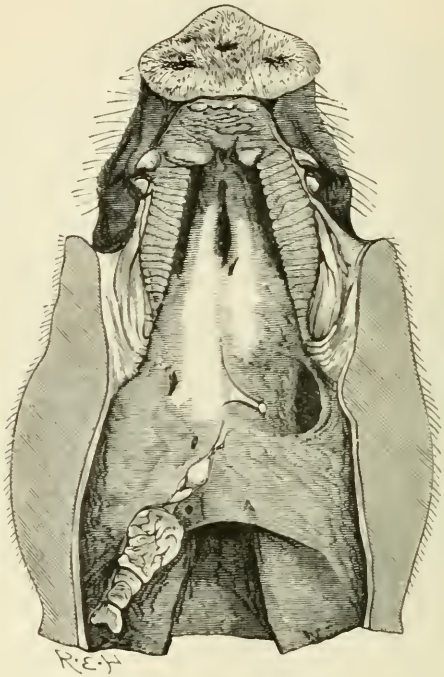

Fig. 6.—The palatal aspect of a pig with the pedicle by which the teratoma was attached to the under surface of the basi-sphenoid. The teratoma has been removed in order to show the smaller pedunculated body. The three narial orifices are shown.

The coalesced supernumerary mandibles are represented twice their natural size in Fig. 7. The root of the tongue lies on the part nearest the

pedicle. At the anterior part, near the symphysis, is a patch of piliferous skin, whilst the mandibles themselves lodge molar, incisor, and canine teeth. The pig is now preserved in the Museum of the Royal College of Surgeons.

In addition to the base of the tongue attached to the supernumerary mandibles, the tongue be-

Fig. 7.—The pharyngeal teratoma from the pig drawn separately. Twice the natural size.

longing to the normal mandibles presented a bifid apex, and was intimately connected with the sides of the pedunculate mandibles.

My third specimen is from the Museum of the Royal College of Surgeons—it is the head of a pig. On looking into the widely opened mouth we find,

wedged in between the upper maxillæ, a tumour presenting unerupted teeth and a piece of pilose skin; there is also a considerable fissure in the palate. The tumour in the palate is connected by a fibrous band with a bony mass, covered with

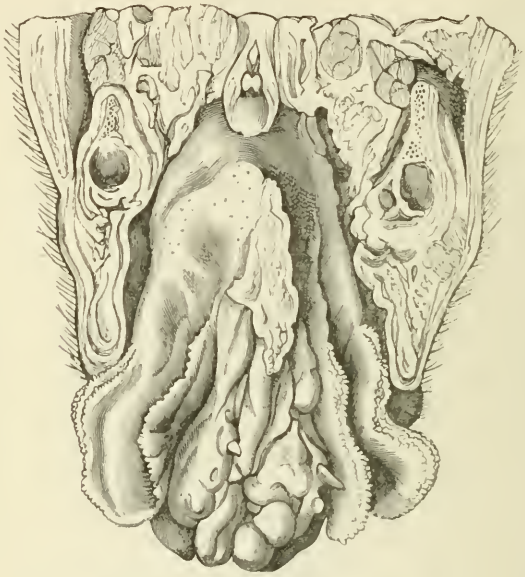

Fig. 8.—The mandible of double pig. The tongue is bifid: between the tongues we recognise the fused mandibles. (Royal College of Surgeons' Museum.)

pilose skin and mucous membrane, presenting unerupted teeth, lying in the floor of the mouth. This adventitious mass represents two supernumerary mandibles fused in the middle line. The tongue is double, one lying on each side of the fused mandibles, Fig. 8.

On examining the palate we find, lodged in between the maxillæ, a teratoma comprised of coalesced supernumerary maxillæ, containing teeth, and covered with piliferous mucous membrane,

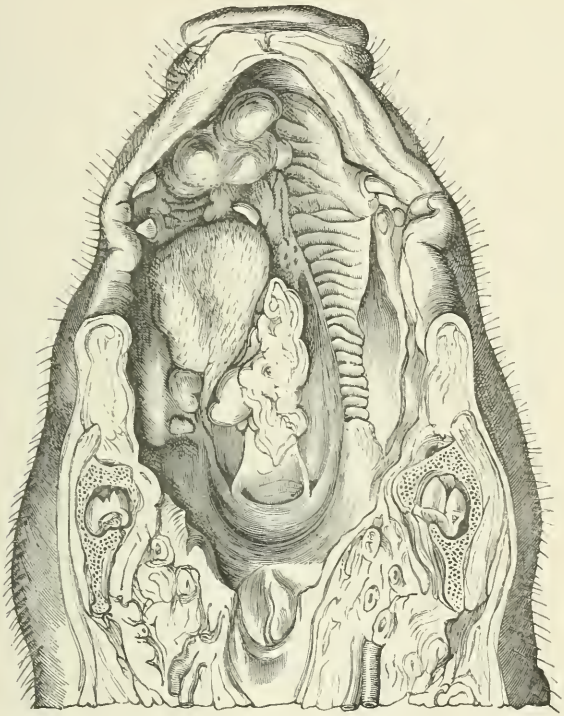

Fig. 9.—The mouth of a pig presenting a pharyngeal teratoma (Museum of the Royal College of Surgeons).

Fig. 9. This mass was directly continuous with the fused mandibles; the connecting band was cut through when the head was divided for the pur-

pose of preparing satisfactory sketches, as well as to show the relation of the teratoma to the facial bones.

These three specimens are of interest inasmuch as they are examples of a process termed dichotomy, which is responsible for a large number of malformations. In the first specimen the tumour is described as a teratoma, and a study of it alone would scarcely enable us to decide whether it be an impacted suppressed fœtus, or due to abnormal division of the cephalic extremity of the embryo. A study of the foal and pigs, however, clears the matter considerably, for we find the dichotomy clearly indicated, partially in the foal and perfectly in the pig, with the production of closely similar tumours.

The pharynx and soft palate are occasionally occupied by pedunculated pear-shaped congenital tumours, of which a typical specimen is represented in Fig. 10. These tumours may arise from the basi-sphenoid, or the pharyngeal aspect of the soft palate. The interior is usually occupied by cartilage, and the exterior is covered by piliferous skin, possessing sebaceous glands. These tumours have been explained in various ways, but I am not by any means satisfied with the various suggestions which have been advanced. It was with some anxiety that I proceeded to examine microscopically the small pedunculated body hanging

beside the mandibles in the double pig. Histologically it conformed in every way with congenital pedunculated pharyngeal tumours in the human subject, and it is composed chiefly of fibrous tissue, covered with skin, possessing sebaceous glands. This tumour, associated with such extensive dichotomy as is exhibited in this pig, cannot fail to suggest that such tumours, occurring in otherwise

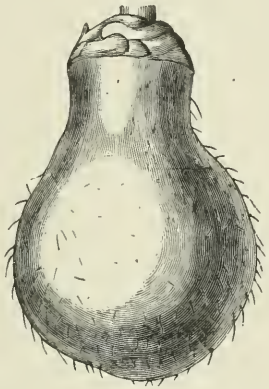

FIG. 10.—A pedunculated pilose tumour of the soft palate. Natural size (after Arnold).*

normally formed mammals, are slight manifestations of a process which finds its maximum expression in some forms of duplex monsters.

Finally, the same process which produces a double monster from a single germ, acts also in a similar way upon the germs of teeth, for those

* Ueber behaarte Polypen der Rachen-Mundhöhle und deren Stellung zu den Teratomen. *Virch. Arch.*, Bd. III, S. 176.

malformations known as gemmation are in very many cases due to dichotomy of an originally single tooth-germ.

The Chairman said Mr. Bland Sutton's communication was an exceedingly interesting and valuable one; if any members wished to ask any questions in connection with it, they would now be in order in doing so.

Mr. C. S. Tomes said he would like to ask Mr. Bland Sutton if he could give any explanation of the fact that the included mass had in each instance shot ahead of its host? In respect of calcification the teeth were far more calcified than they were in the host.

Mr. Bland Sutton replied that it was an exceedingly difficult matter to explain, but it was nevertheless the fact.

Mr. Chairman and Gentlemen,

Before taking up the subject of Copper Amalgams, I would like to exhibit Dr. Taggart's Corundum Disc-maker. You will see that it consists of a large pair of pincers; one jaw contains the dies and blank mandrel, the other is a mere pressure-plate. Broken pieces of corundum wheels are softened by heat and placed in the die, and, on closing the handles, the corundum is forced on the previously roughened surface of the mandrel.

The mounted corundum is then taken from the die and placed for a short time in alcohol, to remove the smooth shellac surface. Not only can every dentist make his own corundum points, but they are better than those ordinarily made, inasmuch as the corundum is made upon the mandrel and cannot get loose.

I would also call your attention to the S. S. White Asbestos Soldering Block. You will see it is a circular block, about one inch thick, hollowed out. By placing two of these together, you have an excellent annealing oven, either for steel or gold work.

Copper Amalgams.

As it has been stated in the professional journals, on the authority of some prominent dentists, that copper amalgam does not shrink, and, as this was quite contrary to my own experience, published by this Society some years ago, I have undertaken a more extended series of experiments, the result of which is now before you.

I have tried four modes of ascertaining the shrinkage, viz., stoppings, inserted in celluloid, human teeth, glass tubes, and the specific gravity test. The latter is the only one I consider of much value, it was introduced by Mr. Charles Tomes many years ago. The reason why the other modes are objectionable is, that the coefficient of expansion is not the same as that of a human tooth, glass probably coming the nearest.

We have here 24 experiments with tubes, 21 of which are with copper amalgam, while the remaining 3 are with silver tin alloy. You will notice that all the copper amalgams have allowed the red ink to pass them, while the silver alloy has shown itself to be fairly tight.

TABLE OF SHRINKAGE.

		Specific Gravity Test.			
5	Specimens of	A	..	·65	Copper.
1	,,	A′	..	·54	
2	,,	B	..	·66	
4	,,	C	..	·61	
1	,,	E	..	·35	Silver alloys.
2	,,	F	..	·15	
1	,,	Silver coin	..	·21	
1	,,	Copper amal. and silver filings		·48	

Masses tested weighed 10 to 12 grammes kept for six days at a temperature of 100°.

We have on the wall a table which I have drawn up, of the absolute shrinkage of some nine or ten specimens of copper amalgam. When I brought before you similar tables some time ago, the accuracy of my experiments was doubted

because a very remarkable result was very fully shown. The earlier observations have, however, been quite corroborated by the more recent ones. You will notice that the amalgam does most of its shrinking within the first twenty-four hours, and that subsequently it seldom remains the same for any length of time, shrinking and expanding in a small but measurable quantity. To decrease the possible errors which might arise in this delicate form of investigation, I have used large masses of amalgam. In the earlier experiments I took less than two grammes, while in the present ones I used ten to twelve grammes. There is a fair amount of agreement in the shrinkage of different specimens of copper amalgam, 60 to 80 milligrams in 10,000.

Table showing Daily Fluctuation.

	November							per cent.	Maximum Shrinkage.
	6th.	7th.	8th.	9th.	10th.	12th.	13th.		
No. 1 ...	12·041	12·113	12·117	12·116	12·114½	12·114½	12·115	·63	76
,, 2 ...	12·010	12·081½	12·085	12·087	12·085	12·088	12·089	·65	79
,, 3 ...	12·015	12·087½	12·095	12·092	12·098	12·098	12·101	·67	86
,, 4 ...	12·010	12·080	12·085	12·087	12·093	12·094	12·098	·73	88
,, 5 ...	12·016	12·089	12·087	12·089	12·091	12·093	12·095	·65	79

The above represents in milligrammes the daily change, increase in weight showing shrinkage.

As a matter of comparison, I have combined with this table similar tests, with the same alloy used in the tube experiments. You will see that the percentage of shrinkage in copper amalgam is from ·5 to ·7 per cent. of the mass, while with one of the two specimens of silver alloy it is a trifle over ·3 per cent., the other a little more than ·1 per cent., or, in other words, the best copper amalgam shrinks four times as much as the silver alloys used.

BREAKING STRAIN.

Bricks 1 m. × 4 m. × 25 m. *Nov.*, 1888.

Kind.	No. of Experiments.	Average strain in ozs.	
A ..	52	$12\frac{15}{16}$	Home-made copper amalgam.
A' ...	36	$4\frac{13}{16}$	,, ,, underheated.
B ...	28	$36\frac{1}{4}$	,, ,, 6th heating.
C ...	37	38	Copper amalgam from manufacturer.
D ...	30	$34\frac{1}{2}$	
G ...	26	$41\frac{13}{16}$	
G ...	23	41	
G ...	20	$34\frac{3}{4}$	
E ...	27	$55\frac{1}{2}$	Silver alloy from manufacturer.
E ...	23	$69\frac{13}{16}$	
E ...	24	$23\frac{15}{16}$	
F ...	35	$63\frac{2}{16}$	
F ..	4	60	
F ...	17	$58\frac{3}{8}$	

Now we come to the question of edge strength. This table shows the breaking strain of the several amalgams already alluded to. The breaking strain was obtained by placing small amalgam bricks, one millimetre in thickness by four in breadth and twenty-five in length, in a crushing apparatus I made for the purpose. These bricks are formed in a steel mould, which we have upon the table. Five bricks of each kind of amalgam were tried, each brick gave me from five to ten breakages.

You will notice the enormous difference that exists between the maximum and minimum, some bricks giving way at a pressure of less than an ounce, while others gave me as high as seven pounds. The difference in strength of the amalgam bricks is owing more to the manner of treatment than to the difference in kind. To get the best results the mercury should be fully driven out of the mass before it is broken up in the mortar. If the ordinary directions are followed and the spoon removed from the heat on the appearance of the globules it will be found that the globules are comparatively weak. It is better to drive off an excess of mercury by overheating and subtracting, subsequently adding what may be necessary to obtain the proper plasticity, than it is to allow some of the combined mercury to remain in the mass. The bricks on the table which are so weak are those made by

underheating the specimens. One of the several specimens both in the specific gravity and breaking strain tests has been heated and worked over six consecutive times, and I find little if any injury resulting.

It will be shown that the silver alloys tested give a better result, not only as regards shrinkage, but edge strength. It has been stated in the text books that silver is the expanding element of silver alloys. In this series of experiments I have only tried one specimen of silver, and that is Standard or Coin silver mixed with mercury. As you see, I fail to get any expansion, but a considerable degree of contraction. Of course a single experiment does not prove anything, but I hope to go into the subject more fully.

I have tried a curious experiment in mixing coin silver filings with plastic copper amalgam. The gravity test has shown a diminution in the amount of contraction.

Amalgams of all kinds are very uncertain bodies; there is a molecular change going on, apparently indefinitely, and, although it may not be sufficient to be a serious practical objection, yet it certainly must be one cause why amalgam fillings are not always satisfactory.

The directions given by manufacturers of copper amalgam are, that it shall be washed in dilute sulphuric acid and subsequently in water. You will see by the litmus paper, that, when these directions are closely followed, the acid is not fully eliminated; after washing several times with water I produce an ounce of amalgam costing sevenpence. The rapidity of precipitation is vastly increased by the aid of heat. I have not found by these experiments that the precipitation by iron gives, in any respect, better results than that of zinc, while the colour is certainly inferior.

Finally, gentlemen, it seems to me that it has been fairly proved that copper amalgam shrinks much more than some silver alloys, and that it has also less strength; but, at the same time, it is undoubtedly a material of very considerable value as an antiseptic, in the stopping of teeth of poor structure.

Mr. W. E. Harding (Shrewsbury) asked whether it made any difference whether the copper was precipitated in iron or zinc.

Mr. Amos Kirby (Bedford) said that the results which he had obtained from his own experiments were different from those of Dr. Elliott. In all cases he found silver amalgams expand considerably, that precipitated silver and coin silver both expanded; when placed in the tube they either split the tube open or projected from the orifice. When measured with a micrometer some showed as much expansion as 1 in 25 of the diameter. The only way he could account for the difference between Dr. Elliott's results and his own was that he (Dr. Elliott) spoke of his silver amalgam as containing 10 per cent. of copper; Mr. Kirby found that the addition of any other metal modified the action considerably.

Dr. Elliott, in reply, said, with regard to Mr. Harding's question, he had never used iron, and therefore could not say. With regard to the expansion of silver, he was aware that it was an accepted opinion that it *did* expand, but he could only say that he had made some 300 experiments simply hunting for expansion and had not found it. Of course he could only speak from his own experience; others might be more successful. Then, with regard to what Mr. Kirby had said, the fact that he (Dr. Elliott) used silver and copper while Mr. Kirby used silver only would be, he thought, a possible, but not a probable explanation of the difference of their results.

Mr. W. E. Harding mentioned a case of tooth fracture, stating that in the previous week a patient, aged just seventeen, came to him and told him that last January she fell down and fractured a front tooth; it was broken in two pieces, the fracture extending in a perpendicular direction. On extracting the tooth he found that the two halves had become united by secondary dentine. The fracture extended across the pulp chamber.

The Chairman said they were very much indebted to Mr. Harding for his communication; if he could let them have the tooth, the Curator would no doubt make a microscopical examination of it, and determine the exact condition of things.

Mr. Harding offered half the tooth, a compromise which was accepted.

The Chairman then called upon Dr. Mitchell for his paper on Metal Cap Crowns.

Some Suggestions on Metal Cap Crowns.

By W. Mitchell, D.D.S.

Mr. Chairman and Gentlemen,

Of late, the subject of my paper this evening has come in for a good deal of attention at the hands of the most advanced members of our profession.

Much has been said and more has probably been written respecting the various methods of crown work, and possibly as much or more ingenuity has been displayed in this direction than has fallen to the lot of any other portion of our practice.

I do not purpose in this paper to go into the evolution of crown work, as that is already too well known to the educated dentist, to need even a passing notice here.

Of the various — and I might almost say numerous—methods of crowning teeth or roots, none present to the dentist, or patient, a greater assurance of success than the metal cap crown, embodying as it does the three essential features requisite to that end, viz.: adaptability to the greatest number of cases, cleanliness, and indestructibility — always bearing in mind that only

bicuspids and molars are to be treated by this method.

This process of capping admits of the restoration of articulating surfaces afforded by no other; for with suitable dies, or only just the addition of a certain amount of solder here or there, its capacity in this direction is limited only by that of the dentist.

While this subject has been pretty freely discussed both in and out of societies, but little of a practical nature has been touched upon, to enable those of a limited experience or capacity to more thoroughly understand the manipulation necessary for the successful completion of this kind of work. It is to that end that this paper is presented.

Taking for granted the tooth or root to be capped is in a healthy condition (*i.e.*, if a devitalized tooth), treatment has been completed and roots filled, I then proceed to prepare the tooth or root for the cap. This is done by various means, principally by corundum wheels of suitable shapes and sizes used on the engine, to reduce in height to allow for restoration of bite, or to admit of adjustment between adjacent teeth.

In bicuspids or molars where the root is on a line with the gum, I find it a good plan to put one, two, and sometimes three good platinum or dental alloy pins in the pulp canals, fitting them first, make them the proper length, and then drive

Fig. 1.

Fig. 3.

Fig. 5.

Fig. 2.

Fig. 4.

Fig. 6.

Harrison & Sons, Lith., 59 Martin's Lane W. C.

them solidly home—they thus afford much support to the cap, especially where it has a good deal of work to perform. After having properly coned the tooth or root, I then go all round the cervical margin with an instrument represented in Fig. 1,* removing every vestige of enamel remaining there. This is easily accomplished by inserting the point of the instrument first under the free margin of the gum, then with a drawcut the enamel is trimmed off very rapidly and effectually.

It will be observed the convexity of the distal surface of the instrument prevents injury to the gum margin. The most careful and thorough preparation of the neck of the tooth is one of the most important factors in the success of the operation, for upon this the fit and ultimate retention of the cap almost entirely depends; hence the absolute necessity for its most careful observance.

This done, the tooth is ready for the cap. For this I use coin gold rolled to No. 5 B.P.G. for the band, and No. 3 for the top. The reason I prefer coin gold is, it works more uniformly than anything else I have tried, and its colour is good in the mouth, besides being quite hard enough to withstand any service it may be subjected to.

In preparing the band I find no model necessary, except the tooth itself—all others being "a delusion and a snare." And here I wish to

* The plate makes the instrument appear too heavy.

remark that any crown made to fit a model other than the tooth itself will not fit the tooth perfectly, notwithstanding all assertions to the contrary. Another reason the band should be fitted to the tooth itself is, it can then very readily be determined how to trim the band to adapt it to the requirements of the gum; this cannot be done when a cap is made to fit a model. I next take a piece of visiting card and approximate it to the height and length for the plate required for the band, a piece of heavy lead foil is very good for a pattern also; then with a pair of medium-sized pliers, with one jaw flat and the other half round (Fig. 2), I proceed to adapt the plate to the tooth, making the band slightly flaring towards the grinding surface.

When I have fitted the band as well as possible, I close it a little by squeezing between the fingers, so it springs over the tooth when put on for trial; should it then not pass evenly under the gum, I trim the band until it follows the contour of the gum. I find a pair of manicure scissors with short but heavy blades the best for cutting the gold used in this work; then having left a line or so for lapping, always having the lap come on the outside for convenience in marking and trimming, mark with the point of Fig. 1 along the lap, remove the band from the tooth, close it about a line, then solder; this is most easily accomplished over

an ordinary bench bunsen, holding the work in a pair of solder pliers, or, what is much better, the device Fig. 3; the bifurcated end is for holding the band, the small ring for supporting bicuspid tops and crowns, the large ring for molars; flush the lap of band nicely. I prefer a lap joint to an edge to edge one, as it is easier to make, can be made just as neatly, and proves a great saving in both time and patience. Having soldered the band, try it on; if it is too tight, place it on the horn of an anvil, when a few light blows with a hammer along the lap will soon stretch it to the required size, and owing to the softness of the gold in a great many instances it will be found the band may be driven on nicely without any stretching.

Should the band on the inside of the lap need any attention after soldering, a half-round file judiciously applied will soon set that all right. I then chamfer the edge of the band that goes under the gum, and burnish it, as it then more readily insinuates itself between the tooth and gum. After the band is started, I assist it to where I ultimately want it by driving it on with a steel mallet, using a piece of apple wood or bone about five inches long, checkered on the end to prevent slipping, as a medium to assist it to its place. I then judge as to the height the band is to be left, marking it, if necessary to be trimmed, remove

and trim; then go round the band with the contour pliers, Fig. 4, these produce the result, Fig. 5. These pliers I designed after trying other methods for contouring, and not being satisfied with the results. After contouring, I take the band and hold its top edge against the flat side of a corundum wheel on the lathe, and by giving the band a slight rotary motion as it is held between the thumb and fingers, a flat surface is secured. It is then ready for the top.

The simplest method I have found for producing these is to take teeth that have been extracted, or models from impressions of natural teeth, investing the roots and crowns in plaster almost to the grinding surface, leaving the block about two inches high; this is trimmed leaving a base about an inch square—or in diameter if a round block is preferred. This leaves it in the best shape for drawing from the marble dust mould. The face of the block is made flat and left one-sixteenth of an inch wide; this is to act as a guide in the finished die, to better assist the operator in utilizing his gold when stamping the top, and later on as a means of holding it while soldering. After securing the model as described, a sand—or, what is better, marble dust—mould is made, this is finished with file and graver, and polished on a lathe.

For the benefit of those who from some cerebral

defect have allowed themselves to believe dental mechanics *infra dig.*—and I am sorry to say there are many such in our profession—I would say, all this part of the process can be performed by any good assistant, quite as well as by the possessor (!) of the giant intellect, who fain would shun the essential detail whereby he is placed in a position to receive a fee, that others probably have done most towards placing within his reach.

Models for crowns can so easily be made by the process described, that any case may easily be contended with. I find by having a typical set of crowns, and a number of irregular shapes or by simply turning a die around, or only partly so, while swaging, almost any combination of articulating surface may be obtained. Another reason why this method is a good one is its simplicity and cheapness; any one capable of making a die can succeed in any case—something that cannot be said of many of the elaborate, costly, and not always time-saving appliances that are in the market. The die having been made as described will appear as in Fig. 6.

No counter die is needed for producing the tops. Simply place the gold to be stamped on a piece of lead, a smooth surface can easily be obtained by a blow with a hammer. I find it best in striking up the top to put a piece of heavy tinfoil between the gold and lead; this prevents any small particle

of lead adhering to the gold and producing sweating during the subsequent stages of soldering. After swaging the top the narrow flat margin can be utilized to hold it during soldering, as mentioned in a previous stage of the process ; flush the top with 20-carat solder, this can be done as with the band, over a bench bunsen burner. Having done this, touch the flat edge of the band with borax, place in the desired position on the flushed side of the top, return to the flame, when top and band will soon unite in the most satisfactory manner possible; drop into pickle while hot, to remove borax, trim off surplus plate with shears, then *grind* off overhanging edges to the required *contour*, polish same as a gold plate minus stoning down, and the cap is ready for its final adaptation.

It will probably be remarked that no provision has been made for the exit of surplus cement. I think experience will teach that no special vent is needed, for no matter how perfectly one may appear to have the cap fitted, the surplus cement will find its way out if mixed to the proper consistence.

The best cements I have found to use in this work, are Richmond's Crown Cement, and Welch's Crown Cement, both kinds producing good results, owing to their smoothness, and a tendency not to set too quickly. The cement should be mixed so

that it will just drop from the spatula; a little experience will soon teach the amount requisite to fill the cap and leave the least possible surplus, which will find its way out round the neck of the tooth as the cap is driven home, this is best accomplished by the method suggested for setting the band; the rest of the operation suggests itself.

I claim for this method that it is the most simple and easy plan of making metal cap crowns known, never necessitating a greater outlay of time than an hour and a half to prepare a tooth, make, and adjust the crown. I have made one and fitted it in thirty-five minutes, thus demonstrating that although descriptive detail involves some little time, the practical application of it in experienced hands reduces it to the minimum, and secures the most satisfactory results.

Discussion.

The Chairman said they might now proceed to discuss Dr. Mitchell's paper, but before doing so he would read a letter received from Mr. Morton Smale bearing upon the subject.

89, *Seymour Street, Hyde Park, W.*

Dear Mr. President,

I had hoped to be present this evening, but am not permitted to go out in the night air for a day or two. I was anxious to say something on the question of Crowning in the discussion this evening; when I found I could not go, I tried to find some models to illustrate what I wanted to say; but I always destroy them, and keep instead (labelled) the special way in which they were taken, and have therefore only been able to find two, but they are typical of cases where I consider crowning the treatment indicated, and where in my opinion no other treatment would be so good. The bicuspid was in a lady, and consequently was faced with a porcelain tooth. The molar was a simple hollow gold crown. Both these cases were fixed with gutta-percha, and answer admirably; in both cases the tooth was dead, and the nerve canals had been filled years ago, and in cases of this character, or of similar ones where it is possible to get the roots healthy and comfortable by treatment, crowning I consider a very valuable addition to our methods of procedure. The first crowning I ever did was some few years ago, when a public man, who had much speaking to do, came with his four lower incisors broken down. They had for years been very much eroded at the necks, and in three days all four had broken; he was in great straits, but in no pain; the next day he had to speak for more than an hour, and begged that I would do something! What could I do? A plate was as bad as no

teeth for his articulation! To devitalize and remove the pulps of four teeth, in a case where none of the pulps were exposed, did not commend itself to me! I was at my wits' end: so to give myself time I took a model, and told him to come the next day at eleven, and when I got that model, the idea came to me to make teeth with a gold cap behind each one: the cap roughened inside, to make sure that Weston cement should keep them firm. I trimmed the teeth on the model to what I thought they ought to be, and filed them up in the mouth with files and wheels when fitting the artificial ones in. They have been there now for some years, and are firm still. I did not think it at all extraordinary at the time, or might have reported it. I imagine everybody in my place would have done what I did, or something better, and that probably many had already done so often enough, and years ago; but since the literature and talk about crowning has arisen, the case has come to my memory again, and I quote it to support those who advocate crowning in well-chosen cases.

Morton Smale.

Mr. Walter H. Coffin said he would like to ask Dr. Mitchell if, when having driven soldered band firmly on to the root, he had any particular or special method of taking hold of it for removal, as he (Mr. Coffin) had found some difficulty in removing softish gold over a root without injuring its form.

Mr. Henri Weiss said there was one point in the cases he had attended which had caused him some difficulty. In the method of adapting a collar to the outline of a root it was recognised as necessary that it should fit accurately. It was also known that by taking a very small piece of gold, bleeding of gums and pain were produced, and that the desired accuracy of fit was not obtained. His own method was to take a strip of gold at least two inches in length, hold the two extreme ends in an ordinary pin-vice. A lap of gold was thus obtained which could be placed over the root and there held firmly. The lateral portions could then be bur-

nished with a burnisher, and the crown forced up the root with the thumb. Having done that he took a pair of fine-pointed pliers and nipped out. Afterwards he removed the excess with the scissors, and soldered.

Dr. W. St. George Elliott reminded the members that some months previously he had the pleasure of bringing forward a plan for producing gold crowns, but his method was very different to that advocated by Dr. Mitchell. He might be pardoned if he had a preference for his own plan. What Dr. Mitchell had said was, however, probably true. He (Dr. Mitchell) no doubt could fix on a crown in half-an-hour or an hour, but it would probably take an ordinary operator three hours, and for that reason Dr. Elliott found he could not give that time. He always prepared roots as quickly as possible; took an impression at once; cast in Spence metal—which gave him practically a perfect model of the mouth that the workman could work to closely. He then took the model and tried it in the mouth, placed the cap on the top, which had been swaged in a very different way from that described by Dr. Mitchell, then filled the cap with wax and made a subsequent appointment with the patient for finally fixing.

Mr. Willoughby Weiss said there was one point which he thought Dr. Mitchell might draw special attention to, and that was the use of coin gold. He (Mr. Weiss) had originally used pure gold, but found it too soft to stand the wear of constant mastication. There was one other small point: he understood Dr. Mitchell that he filled in the crown with some base. That also he considered an important point, because at times the force of mastication was so great that it would wear away and dent in the crown. He had never adopted this plan; if he had done so he thought he would have avoided the denting of the crown which had sometimes occurred. It was his practice to leave a hole in the centre of the crown through which the excess of holding material was able to exude, and after the cap was well secured in its place he then drilled out

the opening and filled it in the same manner as an ordinary cavity.

Mr. Dennant asked whether Dr. Mitchell had used any considerable variety of plastic cements, and had arrived at the conclusion that the two he recommended were the best as the result of his own experience. He also wished to know whether Dr. Mitchell had tried Flagg's plastic enamel. Mr. Dennant had not himself used Flagg's cement, but he had recently heard it spoken very favourably of.

Dr. Geo. Cunningham was of opinion with regard to cements that it would be well if they could have some better description than merely the name of the maker. They ought to know whether it was a phosphate or an oxychloride cement. That was an interesting point. He thought also that Dr. Mitchell might have told them something as to the strength of white cements, contrasting phosphate with oxychloride. There was one objection to the all-gold-crown method which had already been remarked upon, and that was its unsightliness on a first bicuspid. It might be a strong operation, but he (Dr. Cunningham) did not think it the highest form of operative work; it was quite possible to add to it the natural effects of a porcelain tooth. He himself believed that the profession would soon have within its reach greater facilities for fixing bands and avoiding by Mr. Weiss's plan bringing the solder in front. Dr. Cunningham could see that the pin-vice was a good suggestion, but he was informed that Dr. Bing, of Paris, did not solder the bands; by means of compressed air he melted the gold the two ends together. This might be done with compressed air and ordinary gas, using the Knapp blow-pipe, or, better still, oxyhydrogen gas. Referring to porcelain fronts, Dr. Cunningham said that his plan was to made a ring ferrule which would surround the tooth, from that contouring, and letting in the porcelain front to the gold band. The gold band being very narrow in front was easily concealed by the gum or showed very slightly, at any rate it was better than the all gold crown. For his own part he could not adjust

articulation by means of appliances which Dr. Mitchell had described. He preferred using a How's screw, and, if necessary, deflecting; then filling up with a full amount of amalgam on top, and of course that being high up it was possible to adjust absolutely. He thought this plan æsthetically was better than Dr. Mitchell's.

Mr. Walter Coffin remarked, with regard to Dr. Cunningham's porcelain fronts, a patient came to him with an entire gold crown exposed to view, and said "he would like a window made in front." Mr. Coffin succeeded in making the window. He first put in a little porcelain cement and then tried to fix in a porcelain front, but he regretted to say in the latter he was not successful, but he thought it could be done.

Mr. James Stocken some little back had had a case where he had the misfortune to break off a porcelain front—it was the first bicuspid. He countersunk the crown and accurately fitted a porcelain front to it, which answered perfectly.

Mr. Amos Kirby said he thought that the appearance of metallic crowns near to the front of the mouth was objectionable, and further that it was desirable that artificial crowns should be removable so as to give access to approximal cavities in neighbouring teeth should they become affected by decay. He used ordinary flat teeth as a facing, fixing to the back a short piece of tube or casing of dental alloy, in the form of the required crown; this was split from top to bottom on the lingual side, and was attached to the root by an amalgam filling, and could be removed and replaced at pleasure. In preparing the crown a thin backing was first soldered on to the pins, and to this again was soldered the tubular casing, which being the dental alloy was not affected by the mercury contained in the amalgam which forms the body of the crown.

Mr. Betts said, with regard to filling roots, he himself had a tooth filled with Portland cement, and had found it answered admirably.

ERRATA.

Page 61 :—

Lines 23 and 24 omit "; the band could be fitted on to a model out of the mouth, and."

On line 25 omit "It could be adapted to any inequality of the gum."

On line 35 "colouring" should read "contour."

Mr. V. Cotterill said that at least nine years ago he made some experiments with Portland cement for stopping at the back of the mouth. He found that several came out very quickly, but that was due, he discovered, to the way in which the cement was mixed. It must not be stirred up as was done in the case of all oxychloride cements.

Mr. Boyd Wallis had used Portland cement for temporary fillings, and found it answer remarkably well.

Mr. Henri Weiss was under the impression that Dr. Mitchell's paper was upon the adaptation of gold crowns, but as the discussion had deviated somewhat from that line, he might mention that his experience with regard to porcelain fronts was that it never made a water-tight filling. After a time moisture would find its way in between the porcelain front and the gold collar.

Mr. Leonard Matheson pointed out that if after the collar had been fitted a cap was made, one might then fit the crown on to that and no water would get in. The porcelain crown should be fitted to the collar and to the cap.

Dr. Mitchell, replying to the various questions, said, with regard to irregular bands, sometimes it was found that there was considerable difficulty in fitting irregular bands, but it could be done very nicely; the band could be fitted on to a model out of the mouth, and with a pair of fine-pointed pliers it could be adapted to any inequality of the gum. With regard to the method suggested by Dr. Elliott, there was no disadvantage in the method, it was only a little more expensive.

With regard to coin gold, he had found it the best thing. He started on pure gold because it was easy to work, but it was just as easy to wear out. With regard to Mr. Weiss's question, he simply flushed the top with No. 1 solder, it was not necessary to use any with the band at all then. The reason he used No. 3 for the top was because it took the colouring of the crown better. In reply to Mr. Dennant, with regard to cements, the reason he used Welch's and the

Richmond was because they were much finer than other cements, they flowed more easily, and were in every respect better; they were oxyphosphates. With regard to Dr. Cunningham's questions, he was quite right with two exceptions. In regard to first bicuspids, granting it was not æthetic, there was no objection at all to using a porcelain front. With reference to soldering bands, there was no reason why Dr. Bing's method was not a very good one. There was one other point mentioned by Mr. Weiss as to the possibility of moisture; by making any entire solid cap, any difficulty in that direction was disposed of.

The CHAIRMAN said there was one thing more to be done before the members dispersed, and that was to elect Auditors. Mr. James Stocken and Dr. St. George Elliott having been proposed and seconded, were duly elected Auditors for the ensuing year.

The CHAIRMAN announced that the next meeting would be held the second Monday in January (14th), when the election of the Society's officers for 1889 would take place, and Casual Communications read. He requested all members who proposed sending Casual Communications to notify their intentions as soon as possible to the Secretaries.

The Society having passed votes of thanks to Dr. Mitchell for his paper, and to the contributors of Casual Communications, the meeting closed.

Odontological Society of Great Britain.

ANNUAL GENERAL MEETING.

January 14th, 1889.

MR. S. J. HUTCHINSON, M.R.C.S., L.D.S,

Vice-President, in the Chair.

The Minutes of the previous meeting having been read and confirmed,

The Chairman said: Gentlemen, this being the Annual Meeting of the Odontological Society, we commence our proceedings by opening the ballot for the election of President, Officers, and Council for the ensuing year. I have also to announce that the Council have the following recommendation to make, viz.: "That three additional non-resident members be elected at the Annual General Meeting." Perhaps some gentleman will move that as a resolution.

Mr. Felix Weiss rose to move the resolution, and in doing so, said that the feeling of the Council in recommending the alteration of the bye-laws, was that at the present moment, as they were aware, they had nine resident and only six non-resident members of the Council. Having regard to the distance that many of the non-resident members had to come, it was thought desirable to strengthen their numbers by the addition suggested. He trusted that in saying that much, he should not convey the impression that the non-resident members had not hitherto been equally rigorous in

their attendances with the resident members. On the contrary, he felt sure he should have their general concurrence when he said that they would be surprised and gratified by the regularity of attendance of non-resident members; there were some, he believed, who had never been absent from a single meeting. He proposed the resolution then, not to remedy an absenteeism which did not exist, but to give the non-resident members that more adequate representation which it was thought they deserved. He hoped that in time they might propose an extension of town members. In conclusion he moved that instead of fifteen, there should in future be eighteen members of the Council, by increasing the number of non-residents from six to nine.

Mr. Thomas Arnold Rogers begged permission to second the resolution, and did not think it needed any recommendation, believing as he did that it would be cordially accepted. It would be remembered that they began with only twenty members of Council, including all officers; at the present time they had twenty-nine, and if the resolution were carried, they would have thirty-two.

The Chairman said he thought that the resolution would be carried. It was very satisfactory to hear what Mr. Weiss had told them with regard to the regularity of non-resident members. He was sure that the resolution, if carried, would strengthen the Society in every way. The proposition now was—"That three additional non-resident members be elected at the Annual Meeting."

Mr. James Stocken asked whether the new rule could operate before the election next year.

The Chairman, in reply, said that he felt no difficulty in dealing with the point raised, but before doing so he would read Bye-law XXVI, which stated that the President should regulate all the proceedings of the Council and Meetings, and decide all difficult questions. Bye-law XXVII was to the effect that in the absence of the President, the Vice-President should act for him.

Bye-law XLII gave the Council power to fill up any vacancy which should occur between the Annual Meetings. The new rule having become law, vacancies had been created, and he took it that they would be acting in strict accordance with the laws of the Odontological Society in forthwith proceedings to fill up those vacancies. He felt no hesitation in assuming the responsibility of deciding the point. There would be a special meeting convened at which the vacancies would be filled.

The following resolution was then put:—

"That three additional non-resident members of Council be elected at the Annual General Meeting."

This was carried.

The Chairman then requested that all persons present who were not members should withdraw.

The following changes in the Society's Bye-laws were then proposed and carried:—

XVIII. The Officers of the Society shall be elected from the Members, and shall consist of a President, six Vice-Presidents, a Treasurer, a Librarian, and three Secretaries (two in ordinary, and one for foreign correspondence); who, with fifteen other Members, the Curator of the Museum, *ex officio*, and the Editor of the Transactions, *ex officio*, shall constitute the Council, and shall have the management of the Society's affairs.

To read—

XVIII. The Officers of the Society shall be elected from the Members, and shall consist of a President, six Vice-Presidents, a Treasurer, a Librarian, and three Secretaries (two in ordinary, and one for foreign correspondence); who, with *eighteen* other Members, the Curator of the Museum, *ex officio*, and the Editor of the Transactions, *ex officio*, shall constitute the Council, and shall have the management of the Society's affairs.

XIX. The President, three of the Vice-Presidents, the Treasurer, the Librarian, the three Secretaries, and

nine of the Councillors, shall be elected from the Resident Members, but the Council may recommend a President from the Non-Resident Members not oftener than once in three years. The remaining three Vice-Presidents and six Councillors shall be elected from the Non-Resident Members.

To read—

XIX. The President, three of the Vice-Presidents, the Treasurer, the Librarian, the three Secretaries, and nine of the Councillors, shall be elected from the Resident Members, but the Council may recommend a President from the Non-Resident Members not oftener than once in three years. The remaining three Vice-Presidents and *nine* Councillors shall be elected from the Non-Resident Members.

XXII. Of the *fifteen* Councillors, three of the Resident, and two of the Non-Resident, shall go out of the Council by rotation annually; and shall not be eligible for re-election for the ensuing year. The other ten shall remain on the Council.

To read—

XXII. Of the *eighteen* Councillors, three of the Resident, and *three* of the Non-Resident, shall go out of the Council by rotation annually; and shall not be eligible for re-election for the ensuing year. The other *twelve* shall remain on the Council.

The CHAIRMAN: I now call upon the Treasurer to read his report.

The TREASURER (MR. THOS. ARNOLD ROGERS): I am very happy, Mr. Chairman, to record a prosperous year. You will remember last year I said I was afraid we could not look forward to having so large a balance this year as we had then, in view of the greater outlay we should have to incur. The expenses are very much increased; one item of increase is that of rent, and another that of adapting ourselves to the place; further, we have a considerable increase in the cost of our Transactions. I should state that it is very difficult to get the whole expenses included in one year.

Odontological Society's Accounts for the Year November 1, 1887, to October 31, 1888.

Dr.	£	s.	d.
To Annual Subscriptions	428	7	10
Arrears	64	1	0
Entrance Fees	35	14	0
Sale of Transactions	17	2	0
Less Messrs. Harrison's Commission	0	6	3
	16	15	9
	£544	18	7

Cr.	£	s.	d.
By Messrs. Harrison and Sons (*Transactions*, Notices, &c.)	230	19	11
Mr. Bland Sutton (*Transactions*—Illustrations)	21	0	0
Dr. Langmore („ —Sub-Editor, 1886–7)	20	0	0
Dr. Dudley Buxton(„ —Sub-Editor, 1887–8)	28	1	5
Mr. Felix Weiss („ —Portraits)	10	9	0
Rent	131	14	0
Insurance	2	10	6
Churchill (Library)	9	5	11
Pentland („)	4	10	0
Hersant („)	1	5	10
Mr. Storer-Bennett (Museum)	8	15	0
Charlesworth	2	0	0
Chubb (Deed-box)	2	11	0
Tooth (Picture Frames)	2	12	2
Vokins („ „)	1	12	0
Young & Buss (Gasfittings)	1	1	0
Odell & Ives (Receipt Books)	2	10	0
Mr. W. Weiss (Secretaries' Sundries)	2	6	8
Camps (Refreshments and Petty Cash)	21	17	8
„ (Gratuity)	10	10	0
Bank Commission	0	1	10
Petty Cash	10	0	0
	£525	13	11

ODONTOLOGICAL SOCIETY'S ACCOUNTS—*continued.*

	£	s.	d.
Balance, October 31, 1887	359	5	8
Gross Receipts—November 1, 1887, to October 31, 1888	544	18	7
	£904	4	3

	£	s.	d.
Gross Expenses—November 1, 1887, to October 31, 1888	525	13	11
Balance, October 31, 1888	378	10	4
	£904	4	3

	£	s.	d.
Gross Receipts for the Year November 1, 1887, to October 31, 1888	544	18	7
Gross Expenditure	525	13	11
Surplus of Receipts over Expenditure	£19	4	8

Investment Account.	£	s.	d.
New Three Per Cent. Annuities, October 31st, 1887 ..	2,487	14	5
Dividends Invested	73	17	8
Amount in £2 15*s.* per cent. Consolidated Stock, October 31, 1888	£2,561	12	1

Examined and found correct, December 18th, 1888.

JAMES STOCKEN,
W. ST. GEORGE ELLIOTT.

New Members elected from Nov. 1, 1887, to Oct. 31, 1888—		Total
Resident	7	18
Non-Resident	8	
Honorary..	2	
Corresponding	1	
Deaths from Nov. 1, 1887, to Oct. 31, 1888—		
Resident	1	4
Non-Resident	1	
Honorary..	2	
Resignations—		
Non-Resident		1
Removed from List—		
Resident		1
October 31, 1888—		
Resident Members	129	349
Non-Resident	185	
Honorary and Corresponding Members	35	

	£	*s.*	*d.*
Our total receipts from the annual subscriptions have been	544	18	7
And our total expenditure	525	12	11
Balance	£19	4	8

That of course is a very slight balance indeed, but, although we shall have heavy expenses in the coming year, I hope we shall be able to keep them within our receipts.

	£	*s.*	*d.*
With reference to the Transactions, the actual cost has really been	303	1	10
For which we may deduct for	45	15	5
Giving a net cost of ...	£257	6	5

This is a larger sum than we have usually spent, and it is chiefly in consequence of the greater number of expensive illustrations.

	£	*s.*	*d.*
Our rent amounts to	135	18	0
Library Expenses	20	18	9
Museum	10	15	0
Miscellaneous	63	2	7

I think the Treasurer gives the number of new members and the losses by resignation and otherwise.

The number of new members elected for November, 1887, has been—Resident, 7; Non-Resident, 8; Honorary, 2; Corresponding, 1; total, 18. Under the head of resignations we have one removed from the list of members, and one death. With reference to this last, I should like to say one word respecting Mr. George Hilditch Harding. Mr. Harding was, I think, a young man of considerable promise; he had already attained a reputation and a position in his profession. Many here will doubtless remember him as a constant attendant at our meetings, and I am sure that all who remember him will do so with respect; he was a member we shall miss, and we all deplore his untimely removal.

Our total number of members is 349. I should like to take this opportunity of thanking the Society for many kind courtesies and considerations, and would only add that if they wish to show me yet one more kindness they can do so by sending in their subscriptions punctually, and thereby save me a large part of a correspondence which I can assure you is not light.

The Librarian (Mr. Felix Weiss) then presented his report:—

The Librarian's Report.

During the year 1888, forty-nine members and sixty-four students have availed themselves of the privilege of borrowing books from the Odontological Society's Library, independent of those members who have made use of the waiting room for the purposes of reference—a number we should be glad to see increased, particularly on the Wednesday evenings from 6 to 8, when the Library is always open. As this is the last occasion upon which I shall have to tender a Librarian's report, it may be interesting to note the additions which have been made to the Library during the last ten years. 86 English books on dental matters, and 136 vols. of Transactions and Magazines, have been added. 39 German works, and 27 vols. of Journals have been placed in the Library;

while France has contributed 24 works and 3 Magazines, and America 26 vols. and 35 Journals. Together they represent the very respectable total of 376 vols. of matter directly or indirectly associated with dentistry. This does not include a large collection of pamphlets and miscellaneous works which have already appeared in the Transactions of our various societies. It may be interesting to know that the Library at present consists of very nearly 1,200 vols. 48 vols. on some branch of the dental art, and 180 vols. on special or general surgery not included in Crowley's American List, will be found on our book-shelves, and I think the members of this Society may congratulate themselves upon having the most complete Dental Library in the world. I have troubled you with these particulars before vacating the office I have filled with so much pleasure for ten years, for no one is more thoroughly aware of his own shortcomings than I am, but I look to my successor to take up those threads which have slipped through my fingers, and I commend specially to his attention the list of members now included each year in the volume of Transactions. You will have presented to you with this evening's proceedings as correct a list of the addresses and qualifications of each member as the changeable natures of some of our roving brethren will allow.

Before sitting down I may be allowed to refer to the Woodburytype portraits of past Presidents also bound up in the Transactions. Nineteen have already been published, and two more are in a forward state of preparation. These I propose to superintend, and I am happy to say their continuity will be unbroken, as Mr. Charles Vasey's recovery from a serious illness has enabled us to complete the list.

Dr. George Cunningham: If the present is the proper time for comment upon the Librarian's Report I should like to say, Mr. Chairman, that I think it is deplorable that Germany is conspicuous by its absence from our Library, because it is a well-known fact that some of the best works on dentistry are by German writers. I should like also to ask if the Transactions of the International Congress have

been included in the Library; if not, whether the Council would not think it wise to procure a copy.

The Librarian: With regard to German works, I think we may say that we have a very large collection. I think that we have noted that we have 39 volumes and 27 volumes of serials; I may also state that we have a number of volumes which contain a great number of German works bound together. I do not think you will have to complain of a deficiency of German works. In connection with foreign books I may mention that there is one remarkable fact, viz., that we have only one Italian book in the whole of our collection, and that is dated 1563.

The Chairman: The Curator will now give us his report.

The Curator (Mr. Storer Bennett): I am sorry to say, sir, that the Museum of the Society has for such a long time been of such little use to the members. Owing to the large alterations in the building, which were commenced in 1887, all the specimens in the galleries and west portion of the Museum had to be packed away, and it has been a task of no short duration to replace and check them with the catalogue, and therefore, although it may have appeared that the Museum was practically of no use to the members for this last year and a half, I can assure you it is not because there has been no work done. I have much pleasure in stating that nearly all the cases are re-stocked with the specimens; by next year I hope that a large number of the specimens, instead of being merely numbered, will also have descriptive labels. I may say that during the past year the additions to our collection have been fewer than in the two preceding years; whether it is owing to the fact that the museum has been practically closed, I am unable to determine. In 1888 there were twenty-nine specimens added, as against fifty-three in 1887, and forty-one in 1886.

The Chairman then said: I have now to read a letter from Mr. Daniel Corbett, the President of the Society; but before I do so I should like to offer the expression of our extreme

regret that he has been prevented from being present on account of ill-health.

12, *Clare Street, Dublin,*
December 18th, 1888.

Dear Sir,

Until within the last few days I had fully resolved to discharge the duties of your retiring President by my being present at the Annual Meeting of the Odontological Society, and delivering my Valedictory Address, but I find it impossible to do so.

Age has begun to assert its sway, and proves to me every day that I cannot indulge in undue excitement or exertion with impunity.

I must now realize the fact, and from day to day await *that summons* we must all obey; but, I confess, I should prefer to accept service at "Home," rather than in "the land of the stranger." Under these circumstances I must allow the presidental mantle of my dignity to fall gracefully from my shoulders, to be assumed by one infinitely more worthy to wear it, and quietly accept a becoming retirement.

I will ask you to read this letter at the next Council meeting, and convey to the members, collectively and individually, the expression of my respectful and kindest regards.

I am, dear Sir,
Yours very sincerely,
Daniel Corbett.

C. J. Boyd Wallis, Esq.,
Hon. Sec., Odontological Society.

Mr. David Hepburn: Gentlemen, I believe it is customary at this meeting to render our thanks in some form to the retiring officers, and I have great pleasure in rising to propose a vote of thanks to our retiring President, the Vice-Presidents, and the other officers. I think this year we have been particularly fortunate and honoured in having a gentleman of the age and experience of Mr. Daniel Corbett to preside over us, and, considering the distance, we have been happy in being able to see him here at all. His absence would have been the more regrettable had we not had such

worthy and able Vice-Presidents as Mr. Hutchinson and Mr. Mummery, whose urbanity, alertness, and tact, combined with their knowledge of the rules and laws of the Society, have been of the greatest possible assistance to us in regulating and conducting our meetings in a manner calculated to sustain our reputation as a Scientific Society. I have therefore much pleasure in proposing a very hearty vote of thanks to Mr. Daniel Corbett, and also to Mr. Hutchinson and Mr. Mummery and the other officers.

Mr. R. H. Woodhouse: It gives me great pleasure to second the vote of thanks which has been proposed by Mr. Hepburn. I am sure that all he has said we shall endorse most emphatically. The skill and judgment which our Vice-Presidents have shown, exhibit a latent talent which fits them for still higher office. With reference to our worthy President, I do not suppose that it has ever happened before that we have been presided over by a gentleman of such mature years—he makes no secret of his age, indeed I believe he has admitted that he has passed "threescore years and ten." I have much pleasure in seconding a vote of thanks to the President, Vice-Presidents, and other officers.

Mr. Hutchinson: From the kind manner in which you have received the proposition made by Mr. Hepburn, and seconded by Mr. Woodhouse, I think it is unnecessary to put it to the meeting, and I may therefore be spared putting a vote of thanks to you in which I am myself concerned. I should like to say that this meeting most cordially offers its thanks to our retiring President for presiding over us this year, and we also thank him for coming over the number of times he has done. On the part of Mr. Mummery and myself we can only offer you our best thanks for your generous appreciation of our services such as they have been. One word on my own behalf. I confess that at first I was animated with feelings such as I think must have been possessed by that Biblical hero David when he picked up Goliath's sword; but I am very happy in being able to tell you that

owing to your unexampled forbearance, and the able assistance of the Secretaries, I have not had to cut any one's head off while I have been in the Chair. Again I thank you, and you must allow me now to offer our best thanks to our Treasurer, Mr. T. A. Rogers, for the immense amount of care, knowledge, and energy he has given to keeping our accounts in order, and I must be allowed to say a few words of special thanks to our Librarian; in his presence I will abstain from any further words than those of the sincerest thanks for his unvarying courtesy, his long services, and for the incalculable advantage our Library has obtained from his labours. Mr. Storer Bennett, I am glad to say, remains our Curator, and when the alterations are entirely completed I am quite sure that our Museum will bear the marks of Mr. Bennett's indefatigable industry, and will be in a condition of still greater excellence than before the alterations were commenced. In conclusion, I would say that the kind words of encomium which you have passed upon us would never have been earned but for the valuable assistance which the Vice-Presidents have received from our able and energetic Secretaries.

Mr. Thomas Arnold Rogers: I have been asked to return thanks for the junior officers of the Society. I am sure we do return you our best thanks for the appreciative way in which you have recognised our efforts, and for the encouragement you have at all times given us.

The Chairman then requested that six names should be submitted from which two would be chosen to perform the duties of Scrutineers.

Messrs. William Penfold and C. Robbins were selected to examine the ballot.

The Scrutineers, Messrs. Penfold and Robbins, then announced that all those nominated by the Council had been duly elected as officers and councillors of the Society, viz.:—

PRESIDENT.
Henry Sewill.

VICE-PRESIDENTS.

Resident: Messrs. J. H. Mummery, W. F. Forsyth, and S. J. Hutchinson.

Non-resident: Messrs. G. C. McAdam (Hereford), J. Cornelius Wheeler (Southsea), and W. Bowman Macleod (Edinburgh).

TREASURER.
Thomas Arnold Rogers.

LIBRARIAN.
Ashley Gibbings.

CURATOR.
Storer Bennett.

EDITOR OF THE TRANSACTIONS.
Walter Coffin.

HONORARY SECRETARIES.
Messrs. C. J. Boyd Wallis (*Council*), E. G. Betts (*Society*), and J. Ackery (*Foreign Correspondence*).

COUNCILLORS.

Resident Members: Messrs. John Fairbank, David Hepburn, Ashley W. Barrett, R. H. Woodhouse, L. Matheson, W. Scott Thomson, C. S. Tomes, Willoughby Weiss, and W. H. Woodruff.

Non-resident Members: Messrs. E. Apperley (Stroud), J. H. Redman (Brighton), R. Wentworth White (Norwich), T. C. Parson (Clifton), R. T. Stack (Dublin), F. J. Vanderpant (Kington-on-Thames), A. A. de Hessert (Aberdeen), M. de C. Dickinson (St. Leonard's-on-Sea), Alex. Fothergill (Darlington).

The reports having been accepted, the CHAIRMAN called upon the contributors of Casual Communications.

Mr. William Hern reported a case of embedded denture in the lower jaw, causing loss of function of the right gustatory nerve.

He said: The case is interesting, not only for its rarity, but also on account of the exceptional lesion connected with it.

Jane B., æt. forty-five, came under my care on May 8th, 1888, when she presented herself at the Dental Hospital of London, and complained of something being amiss with the tongue and mouth, although not of much pain. Patient, whose mouth and breath were very fœtid and offensive, was wearing a partial set of teeth with springs, which she states "has not been removed for about ten years." Her husband having a very strong objection to artificial teeth, she was afraid to remove them, for fear of betraying the secret. The upper plate was of vulcanite and almost complete; the lower plate of dental alloy carrying one molar and two front teeth on the left side only.

On looking into the mouth without a mirror, hardly any portion of the lower plate could be seen, as a large mass of granulations under the tongue obscured the central portion, while the sides were so deeply embedded that the springs appeared to work out of the gum and granulation tissue.

On examining the mouth with a mirror, portions of a metallic plate could be seen between the exuberant granulations; this plate had slipped downwards, backwards, and to the right of its original position, in such a manner as to cut through the frænum of the tongue and to embed itself deeply into the floor of the mouth and the inner surface of the ramus and body of the lower jaw on the right side.

The right anterior pillar of the fauces was also cut through at its junction with the tongue.

The right half of the tongue is quite insensitive to tactile sensations; it is also wanting in the special sense of taste when tested with salt, sugar, and sulphate of copper. There is no anæsthesia of lip or gums on that side.

The springs were cut, and the upper plate easily removed, but the lower one with considerable difficulty, accompanied with a good deal of pain and somewhat free hæmorrhage.

The patient has been seen from time to time since; the wound of the mouth has healed, and the granulations and induration about the frænum of the tongue have disappeared.

Sensations of touch and taste have to some extent returned, but are very incomplete at present. Patient complains of a sense of tingling occasionally near the tip of the tongue on the right side.

(At one of the visits of the patient, subsequent to the removal of the plate, a white cord was noticed on opening the mouth widely, beneath the mucous membrane near the anterior pillar of the fauces on the right side, which proved to be the gustatory nerve, for on pinching it slightly with a pair of forceps, a disagreeable sensation of "pins and needles" was felt by the patient, referred to the tip and right side of the tongue.)

Before the removal of the plate from the mouth, models were taken, and the plate set, as near as could be, in the impression before casting. Another model was taken some time subsequent to the removal of the plate. These models I shall have much pleasure in presenting to the Society Museum; they show the position occupied by the plate fairly well, but do not show the loose mass of granulations about the frænum of the tongue and about the ends of the plate.

Cases were reported by Mr. Canton and Mr. Claude Rogers, in 1879 and 1880, of a somewhat similar kind, in both of which *springs* were worn.

Mr. Frederick Canton: The somewhat similar case of mine to which Mr. Hern has referred is one in which I was sent for on account of the difficulty the patient had in swallowing. The appearance was that of two huge tongues. She had a lower plate with a gold bar, and the gold bar had cut through the frænum of the tongue, which had united over it. The bar had to be cut out of the mouth. The most marvellous fact in connection with this case was that the patient was able to stand the ulceration which had been going on; it had proceeded so gradually that she had not had much pain.

The Chairman: I think the Society is very much indebted

to Mr. Hern for mentioning these cases; they are practical cases such as we may meet with in our daily practice.

Mr. C. Robbins: About two years ago a medical man brought a patient to me who had had a breast removed for cancer. She was afraid she had cancer in the mouth. I made an examination and found that the plate she was wearing was firmly embedded in the tissues of the month, the back of the case was coated very much with tartar, which covered the floor of the mouth. I learnt upon inquiry from her that the plate had not been removed from her mouth for nine years. She told me that her last dentist made the case such an excellent fit that it never required to be removed. It was with extreme difficulty that I could remove the plate; when I had done so I found the mouth in a sad condition. I suggested a lotion of tannin and chlorate of potash.

Dr. Mitchell: Mr. Chairman, I should like to ask Mr. Canton whether in his case there was any impairment of the sublingual glands.

Mr. F. Canton: No, sir, there was no impairment.

Dr. Geo. Cunningham: All the cases previously mentioned have been lower dentures, and usually with springs. I may mention the possibility of somewhat similar if less grave effects being produced by an upper denture without springs. A case came under my notice in which from a full upper denture causing irritation at the posterior edge of the gold plate, such a growth of mucous membrane and gum tissue took place that the flap of new growth gave the appearance of a double palate. The corrosive action of the secretion from the ulcerating surfaces was such for some distance that the original thickness of gold plate was greatly reduced, until it ended in a keen knife edge. The overgrowth probably originated from excessive pressure at the posterior margin of the plate, intensified by a movement backwards from absorption of the alveoli anteriorly after extraction. I regret I am unable to give the history of the case, as the patient did not adopt my advice, which was that the plate

should be at once discontinued and the extensive flap of tissue removed.

Mr. James Stocken: A case of an embedded upper gold denture came under my notice. The patient had worn the case or seven years without having once removed it. It had evidently been inserted after the extraction of several molars and other teeth; it was a large suction plate with springs. The subsequent absorption had left a considerable space between the gold plate and the gum; moreover the edge of the plate had cut deeply into the sulcus, setting up a very considerable amount of irritation and ulceration. The result of this was a vast amount of gum growth. When called in to see the patient I found hypertrophy of the gum had taken place to such an extent that not only was the space between the plate and the gum filled up, but a complete pad of gum around the plate causing considerable protrusion of the upper teeth. Having removed the plate I treated the mouth with tannin and arsenic, from which the patient obtained relief. I at first thought that it would be necessary to cut away part of the gum.

Mr. Hockley: I think, Mr. Chairman, that there are few of us who cannot recount similar experiences in our practice, all of which illustrate the importance of instructing our patients to remove their plates frequently.

Mr. F. Canton: Where gold plates with springs have been worn I think the conditions to which we have been referring may in many instances be attributed to a want of fit in the plate resulting in a sawing motion by which it has gradually worked its way into, and become embedded in, the mucous membrane.

The Chairman: May I just point out that it would be interesting to know the result of the treatment: whether in the cases referred to the mouth has been restored to a completely healthy condition?

Mr. James Stocken: In my case, sir, it did not resume its normal condition, but the mouth became much more comfortable.

Mr. Hern: With reference to the case that I have referred to, I will only say that the patient was very apprehensive that cancer would result, and I was not free from anxiety myself; however, although the wound is still observable, the induration and large granulations have completely disappeared.

The Chairman: I will now call upon Mr. E. Lloyd Williams for his Casual Communication.

Mr. E. Lloyd Williams: The case which I wish to bring before the Society is only interesting as an instance of absorption of both hard and soft tissues in the mouth as the result of constant pressure, and in this respect it resembles to some extent the interesting case mentioned by Mr. Hern. The patient, a man fifty-one years of age, applied at the Dental Hospital in July last, in the following circumstances. He stated that about two years previously he had suffered some inconvenience from two upper molar teeth on the left side, which had become very loose and painful. He eventually got rid of the teeth by the aid of his fingers, but whether they had been pushed into the mouth, or whether any portion of either of them had been forced into the antrum, it was difficult to determine. The history of the case was necessarily a little clouded from the fact that the patient was totally blind as the result of a skating accident; it was, however, to be ascribed to alveolar abscess, where some amount of necrosis had taken place, involving the antrum. To obviate the discomfort of a passage between the mouth and the nose, the patient had plugged the opening with gutta-percha. The plugs had to be enlarged as time went on, and then the patient had decided, in his own words, "to bed the gutta-percha with something that would not *give* quite so readily," and for this purpose he had selected a piece of lettuce stalk. On examination, I found that a large opening, about an inch in diameter, communicated with the antral cavity, and the latter had been considerably enlarged, there being an extensive opening into the nose, and it extended above almost as far as the orbital plate. The cavity was lined with mucous membrane, and this was ulcerated in several places, but there

were no portions of bone anywhere exposed. The model which I pass round, Mr. Chairman, gives a good view of the opening. I have also here the gutta-percha plug, and the piece of lettuce; the latter, however, has suffered somewhat from maceration. The treatment I adopted was to insert a plain vulcanite plate, which acted as an obturator. I would mention that my patient, to add to his other misfortunes, recently swallowed a brass screw, and has been in the wards of St. George's Hospital trying to get rid of it. He has, however, this afternoon been discharged, and will present himself for examination after the meeting.

The Chairman: I have much pleasure in announcing that Mr. Williams's patient is here, and will be pleased to be examined at the close of the meeting. Mr. Storer Bennett, I think, has a Casual Communication to make.

Mr. Storer Bennett: What I have to say, Mr. Chairman, is hardly worth being called "a Casual"; it is simply to present to the Society two skulls: one of a Cheetah, which I was fortunate enough to obtain from the Zoological Society. It is quite perfect, and is another example of carnivorous creatures. The other specimen is the skull of a young seal; it is interesting in so far as its dentition is complete; it has the normal number of teeth, but they are not all erupted, and we thus have the transition between the first and second dentitions shown.

The Chairman then called upon Mr. Hayman to read his communication.

Mr. C. A. Hayman contributed notes of a case of facial disfigurement, the supplying of an obturator and artificial cheek and eye.

About two months ago William Trotman, aged forty-six, called on me, having had the greater part of his face removed, in consequence of a large sarcoma of superior maxilla.

1. *History.*—The history of the case is as follows. About two years since there was a slight protrusion of the right eye

and that side of the nose, and the swelling increased for six months.

An operation was performed upon him by Mr. Board, at the Bristol Royal Infirmary, who removed the superior maxillary bone, leaving the floor of the orbit. As soon as the wound was healed, the tumour recurred, and after six months the patient was again operated on. Six weeks later a swelling formed below the right eye; and after two or

three consultations, the surgeons decided that the right eye and floor of the orbit should be removed with the tumour; the patient would not submit, but left the infirmary. About six months afterwards he presented himself at the Middlesex Hospital; the tumour on the side of his face was then about the size of an orange, of a dark colour, and discharging blood and pus. There were no enlarged glands beneath the jaw or in the neck. After a few days' rest Mr. Morris operated,

making the necessary incisions, and dividing the bones with cutting forceps: the tumour, *with the eye*, came away *en masse*.

After the operation a large chasm remained, the roof of which was formed by the roof of the orbit, its inner wall by the septum of the nose; its outer wall by the outer wall of the orbit, pterygoid processes, and ascending ramus of the lower jaw. The floor was formed by the tongue and a portion of the soft palate, which was left intact. Posteriorly it communicated with the pharynx by a wide opening, in which, behind the posterior edge of the nasal septum, the trumpet-shaped orifice of the Eustachian tube of the sound side was fully exposed to view.

Contrary to the expectations of the surgeons, he made a good recovery, and an artificial appliance has been made which enables him to speak and eat with comfort; and at the same time giving him a presentable appearance.

2. *Model.*—When the man came to me, to see if I could do anything for him, I found in the first place it was necessary to get a model of the mouth; this was very difficult, as the lips were contracted after the operation, there being no facial muscles remaining to oppose those on the left side. But after modelling a tray in wax, and making it in vulcanite, a model was taken in A 1 composition; and an ordinary upper plate made in the usual way.

3. *Making palate hold.*—This palate was very different from obturators used for congenital cases of cleft palates, and more difficult to hold in position, there being only one side of the natural palate on which to support the plate; whereas in congenital cases the cavity is in the centre of the mouth, leaving two sides on which to rest the obturator. So a slight flange of vulcanite was extended to fit outside the face in front of the ramus of the lower jaw, and against the septum of the nose; then a large wedge of vulcanite was added, to fit into the posterior nares; this had the desired effect; the palate was secure, and speech and mastication considerably improved.

4. *Model of the hollow face.*—Being satisfied with the position of the obturator, a model of the remaining hollow was

taken in beeswax; this was cast in plaster of Paris, moulded in sand, and casts and dyes taken in metal.

5. A silver plate made in two sections was struck up, soldered together, and accurately fitted to the face, care being taken that it fitted under the right ala of the nose, and that a piece of silver came over the bridge of the nose on which to solder the spectacles.

6. The artificial cheek and eye were then modelled in wax

to match the other side of the face; this was then moulded in sand, and metal casts and dyes taken.

7. A large piece of silver was struck between the metal casts (models) and fitted and *soldered* to the inner plate, like putting a cover to a box; it is necessary to drill a vent-hole to prevent the whole arrangement from warping when cooling.

8. *Position.*—In order to keep the mask in position, a

strong wire was extended from the cheek round the right ear, and a pair of spectacles soldered on to the nose piece; an elastic band joined the ends of the ear pieces of the spectacles at the back of the head; this answers very well.

9. *Painting.*—The eye and face were then painted and japanned. The case so far is satisfactory, the patient can eat and speak, and I think you will allow that his facial delineaments are to some extent not unpleasingly restored.

Mr. C. A. Hayman, in reply to the various questions, said: The palate is solid, I am sorry to say, because of course it is heavier on that account, but it was necessary as it could only be made by a process of building up, small pieces of vulcanite being added to the original plate. The patient takes off one cheek at night, but leaves one plate in, as I am apprehensive that he would otherwise catch cold. I have instructed him to keep the plate very clean. The large opening at the back of the artificial cheek has to be kept full of cotton wool. If the apparatus hurts him at all he has to come to me at once. In reply to Mr. Charters White, Mr. Hayman said the apparatus had been worn since last January.

Mr. Charters White: Mr. Chairman, May I have the pleasure of offering these photographs, which Mr. Hayman has given me, to the Society? They illustrate the case he has brought before us this evening, and he wished it to be noted that the *surgical* operations were performed by Messrs. Board and Morris.

The Chairman, having thanked Mr. White, called upon Dr. Mitchell.

Dr. Mitchell: The first case which I wish to present to your notice this evening is one of rather peculiar irritation in the inferior dental nerve. A gentleman came to me requiring a partial lower and an upper denture. I had great difficulty in taking an impression owing to an inordinate tendency to retching. I could not take one in plaster of Paris. When the sets were ultimately completed, and I put the lower plate into its place, the patient complained of acute

pain, and there was inordinate coughing and retching, accompanied with cerebral congestion incidental thereto. Careful examination showed that the symptoms were produced by the plate—which was only of ordinary dimensions—impinging upon the inferior dental nerve, which was evidently very high up. I could trace it with a ball-pointed burnisher. I should mention that the patient had lost his molars and bicuspids by absorption of the subjacent tissues; the prominence of the nerve was thereby greatly increased. Digital examination on either side, but particularly on the left side, produced all the symptoms that the plate produced. The way I dealt with the case was to shorten the plate and put in one molar instead of two. I found that probably his previous plate had been constructed in the same manner for the same reasons. This plan resulted in the cessation of all discomfort and unpleasant symptoms. I have also a case of restoration, which is a little interesting inasmuch as it is restoring the features on the *inside* of the mouth, while Mr. Hayman's was on the *outside*. I have marked on the model which I have here where the perforations occur. You will see that it is the restoration of the anterior portion of the superior maxilla by the adaptation of a continuous gum case, an equivalent to the portion of the maxilla anterior to the second bicuspid on the left side and first bicuspid on the right, being restored in porcelain and posterior to those points as with an ordinary case. The patient is quite unable to speak or drink without the case.

The CHAIRMAN: It only remains to thank those members who have brought forward communications, and I think we are very much indebted to them. The next meeting will be held on the 4th February, when the President will deliver his Inaugural Address, and Casual Communications will be read.

The Meeting then adjourned.

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

February 4th, 1889.

MR. HENRY SEWILL, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the Annual General Meeting having been read and confirmed,

MESSRS. GEORGE DENNIS CURNOCK, L.D.S., of 44, Finsbury Circus; W. H. KENDALL, L.D.S., of 22, Finsbury Square; were elected Resident Members; and MESSRS. F. EARLE HUXLEY, M.R.C.S., L.D.S., Ed., of 23, Waterloo Street, Birmingham; and J. J. ANDREW, of 2, Belgravia, Belfast, were elected non-resident Members of the Society.

The LIBRARIAN (MR. ASHLEY GIBBINGS) announced that the Library had received the Annual Calender of the Pharmaceutical Society and the usual monthly periodicals.

The CHAIRMAN then called upon the contributors of Casual Communications, and

MR. DAVID HEPBURN said: I have to show a specimen which represents an impacted lower wisdom tooth in relation with the second molar. It gave considerable trouble in extraction, and I only quote it because it demonstrates the fact that it is not always wise to persevere in an attempt to extract a tooth which will not yield to ordinary methods. The position of the tooth is shown in the preparation, which illustrates three points: that the tooth is lying horizontally; that there is a deep depression between its fangs without actual bifurcation, so that it was locked within the alveolus, and

that there was a deep cavity of absorption caused by pressure on the posterior surface of the second molar. Six months ago a lady applied to me to have this tooth taken out, and although it did not look at all promising, after placing the patient under gas, I attempted the removal of the tooth with the elevator, but only succeeded in bringing away a portion of the crown. Considerable inflammation followed the operation, but the tooth was allowed to remain for six months without giving any great annoyance. A few weeks ago I removed the second molar, and then the wisdom tooth, which I thought was the wisest plan to adopt.

The President: As this case will no doubt give rise to some comment, and the members will be in a better position to make remarks after having seen the specimen, I would suggest that it should be passed round, and I will meanwhile call upon Mr. Ackery, who has a communication to make, and we can afterwards take the discussion upon Mr. Hepburn's case.

Mr. Ackery then read the notes of a case in which a piece of a lower stump forceps was discharged through a fistula in the gum, after having remained in the jaw for eight years.

History.—When I first saw the patient in 1885 I observed a fistulous opening near the apex of the 1st lower right bicuspid. This tooth showed no sign of periostitis, but had an amalgam filling on its distal surface, and suspecting it might be the cause of the fistula, I removed the filling and came upon an unfilled and stinking canal. During the treatment I failed to force any medicament through the fistula, and after a time the canal and tooth were filled, but the discharge still continued. The second bicuspid was tested and showed the presence of a living pulp. One of the first molar stumps was present, but being quite superficial seemed unlikely to be the cause of the mischief. These were, however, looked upon as a possible cause of the mischief, and were removed in May, 1886, but all to no purpose. The patient then passed from my observation for some time, but when I saw her again in 1887, she informed

me that a piece of black stopping had made its way through the opening of the gum, and that the fistula had very soon healed up. On examination, the foreign body turned out to be a piece of the blade of a lower stump forceps about three-sixteenths of an inch in length.

Upon inquiry the patient gave the following history. In either 1878 or 1879 an attempt was made, under gas, to remove the first right molar, but it was broken at the first essay. On gas being administered a second time, several fragments were removed, and the patient was under the impression that nothing was left. After a short time, however, a stump came to the surface, but as it caused no pain was allowed to remain undisturbed until I removed it in May, 1886. For some years prior to this, small gatherings appeared, and broke without causing serious inconvenience, and even after the removal of the stump continued at short intervals until November, 1886, when the piece of forceps worked its way through the gum, after having remained imbedded some seven or eight years. I may add that the operator was known to many of us as a careful man, and I can only presume that in the rapid change of instruments which we all know is often necessary when operating under nitrous oxide, the fact of the forceps having been broken was overlooked, or at any rate the presence of a fragment in the jaw was never suspected.

The PRESIDENT: This case of Mr. Ackery's seems almost unique. I have no doubt that some members will have some remarks to make to add to the interest of the record. There are a considerable number of extraction accidents recorded in the transactions of the Society, and I think all accidents should be recorded, especially for the advantage of young practitioners. A young practitioner often gets a good deal of undeserved blame in these circumstances, and it is a most unpleasant thing. I confess to having had similar experiences in my own early days.

MR. BOYD WALLIS showed two models representing a cleft palate with a slight fissure in the soft palate. The interesting

part of the case was, that the patient, who was now about twenty-five, was wearing a plate which was made when he was only eight years old. He also showed four upper incisor teeth illustrating a severe case of pyorrhœa alveolaris occurring in a girl aged eighteen: three of the teeth she pulled out herself, and the other Mr. Wallis removed; all the upper teeth and lower centrals were loose. He exhibited also an artificial nose and ear made in celluloid for a syphilitic case.

The PRESIDENT: Has any one now any remarks to offer upon Mr. Hepburn's communication?

MR. W. H. COFFIN: In a similar case to that narrated by Mr. Hepburn, in my own practice, I replaced the extracted second molar, and I believe that Mr. Arthur Underwood has also done it. It seems a class of cases specially adapted for replantation, and where that course may be legitimately resorted to. It no doubt occurred to Mr. Hepburn, and from the fact of his not having replanted the tooth, I presume there were special reasons for his not doing so.

MR. HUNT (Yeovil): I have myself extracted a second molar for the purpose of removing a malplaced wisdom tooth, and replaced the second molar, and I have had no untoward results. In another case of involuntary extraction, it was necessary to take out the first bicuspid in order to allow room for the second molar to develop. The second molar had been arrested in its development owing to the progress forward of the first molar. There were other teeth to take out, and I left this to the last, because it was fairly easy to extract, and I knew it would only take a minute or so. I found it impossible to separate the first and second bicuspid, because they both occupied one common socket, and with the utmost force I could not separate them, so that, *nolens volens*, both teeth had to come out.

MR. BETTS: I adopted another course in dealing with a similar case. I took out a second molar, and the wisdom tooth, which originally appeared to be horizontal, afterwards took up a very fair position indeed. I also had a case a little while ago where the molar was put back successfully.

Mr. D. Hepburn, in replying, said: I have no remarks to offer, Sir, except that my patient's object was to get rid of as many teeth as possible, and she was therefore opposed to replantation.

Mr Boyd Wallis, in reply to a question, said that the celluloid injector he used for making the nose and ear was designed by himself, the injecting cylinder was surrounded with asbestos, which prevented burning of the celluloid. The models showed the intricate designs into which the celluloid could be shaped by the injector.

Mr. Storer Bennett: With reference to the long time that Mr. Wallis's patient was able to wear the artificial velum, I had the opportunity of seeing a case made by the late Mr. Nasmyth, and worn for more than four years. It was a gold plate united by means of a hinge and a spiral spring at the back. I only mention this as an example of extremely good work done when the means of doing good work were nothing like what they are now.

Mr. Walter H. Coffin: I am sure, Sir, that every member here must have seen what is called a self-pouring coffee-pot, which I find very useful in the operating room for hot and cold water. In scientific language I might say that the energy expended in pressing the piston lid is in exact ratio to the quantity of water desired to be raised and displaced from the pot. I believe the question of platinum plating has been before the Society before, but I thought that my experience might be useful. I have had many articles and instruments plated by the method, and you will see, Sir, that they are very bright. The process is very satisfactory so long as the articles are exposed to the ordinary atmosphere and are not rubbed; they withstand the action of oxy-phosphates and phosphoric acid, but with corrosive medicaments, such as iodine, I regret to say it is not so satisfactory. Strong preparations of iodine will eat through the plating to the iron underneath. I have also some small cylinders of amadou prepared by punching out with a sharp punch. I find that these can be most nicely inserted into small cavities, and when

warmed on a tray they will dry a cavity almost as effectually and with less pain than a hot air syringe. I also use discs of Chinese paper prepared in the same way. For these very useful additions to our list of absorbent materials I am indebted to my brother, Mr. Harold Coffin.

Mr. Barrett: I should like to show the Society a piece of mechanism which I find very serviceable. It combines two or three very useful features. It is a mouth-opener and a gag in one. It is designed to be used after chloroform is administered. The wedge is inserted between the teeth, and is extremely powerful, and the mouth is rapidly opened by it. There is a flexible arm on the hinge which adapts itself to the jaws, and so prevents the instrument from slipping. It is intended that it should be used immediately after a patient has taken chloroform. A small quantity of chloroform may be administered and the mouth forcibly opened.

Dr. Dudley Buxton: I should like to point out, Sir, that it is a most dangerous practice to commence any operation after giving a whiff of chloroform.

Mr. Barrett: I am not advocating a mere whiff of chloroform, but administration of chloroform to a moderate extent, sufficient to produce anæsthesia without muscular relaxation. I have tried the appliance for nitrous oxide inhalation, but it is not applicable.

Mr. Hunt: I think, Sir, that such communications as Mr. Coffin has made are very useful to members of this Society, and therefore I venture to make another. For many years I have been in the habit of using what is known as a "Norwegian jug." It is intended for keeping grog hot, and it *does* keep it hot. It is a very useful thing for keeping water hot in the operating room.

Mr. Storer Bennett: I should like to mention, with reference to Mr. Coffin's remarks on platinum plating, that I possess a pair of forceps made of solid nickel, which are extremely resistent to any corrosive medicaments.

The President then delivered his inaugural address.

PRESIDENT'S INAUGURAL ADDRESS.

On taking this chair for the first time, my most difficult task is to fitly express my thanks for the great honour you have conferred upon me, and to adequately set forth my sentiments of pride and gratification at finding myself in so elevated a position. It has been said, and I am very willing to believe it, that election to this chair forms the highest compliment which the dental profession can pay a member. I should be callous indeed if I were not deeply moved by such a mark of esteem; and I should be pervaded by a spirit of egotism more powerful than I can acknowledge withal if I were not fully conscious of my unworthiness in many respects. In conventional language, which is none the less sincere because hackneyed, I can only say that I most heartily thank you; that I shall do my utmost to merit your confidence, and that during my year of office I shall devote myself to the promotion of the welfare of our Society. If I have any qualification for this position, it is mainly owing to the fact that I have passed through several subordinate offices.

The experience there gained made manifest to me that the success of a session, although dependent perhaps largely upon the President, depends more upon the officers, particularly the Secretaries, and most of all upon individual members. If members will do scientific work, if they will attend meetings and bring forward the results of their labours, enter with spirit into discussions, and recruit our ranks with eligible candidates, success is certain. I am sure of the zeal and devotion of our officers; and I will earnestly beg, for the sake of the Society and for my own sake, that members will exert themselves to render this year not inferior in achievement to those that have gone before.

My next difficulty is to discuss in any novel, attractive, or instructive manner that which must necessarily be my theme to-night, Odontological Science. The sole reason for the existence of our Society is the pursuit and promotion of dental science; and although questions still unanswered and problems still unsolved are of high interest, they have become by this time well worn. They have been eloquently and learnedly discussed by more than thirty preceding Presidents; and it would require literary skill and the gift of language far exceeding my feeble endowments to present them in any form which should not appear somewhat flat and stale even to junior

men, and probably wearying and unprofitable to senior members.

"Notwithstanding all that has been hitherto accomplished, there yet remain unfinished tasks sufficient to satisfy the scientific ardour of our most zealous labourers. But of the questions which are still left for solution, perhaps those concerning the etiology of caries are to us among the most difficult as well as interesting. To illuminate all that is dark in our knowledge of the prime cause of tooth decay, inherent structural inferiority of enamel and dentine, demands far-reaching research. Evolution is an agent; for we have the demonstrated fact of the diminishing development of the organs of mastication from the anthropomorphic apes by regular gradations through savage races of man to the civilised European. The question of heredity is involved; for we see the dental characteristics of parents, even in the quality of the tissues, transmitted to children; often the teeth of offspring will closely resemble those of one parent, the girls as a rule taking after the father, the boys after the mother. Again, disease acquired by parents often leaves its mark upon the tissues of their offspring; and although the typical teeth of Hutchinson, the significance of which is unquestionable, are present in only a small proportion of undoubtedly syphilitic children, their occasional occurrence clearly shows

the power of hereditary disease to influence the development of enamel and dentine.

When we consider that differentiation of the rudimentary mucous membrane into the germs of the future teeth is demonstrable before the seventh week of intra-uterine life, when we recollect that hereditary bias largely governs the formation of the organs, and when we bear in mind the early periods in infancy and childhood at which the outer shell of temporary and permanent teeth has become calcified and physiologically unalterable, it seems evident that to produce sound dental tissues we must, above all, direct our energies to improvement of the race.

Disease is no necessary accompaniment of civilisation. Most diseases which lead to deterioration of the human species and leave their mark upon the organism, including the teeth, are at this day preventible, and the time must surely come when every zymotic malady shall be as unknown in civilised lands as the plague; when scrofula and rickets, and all diseases the products of darkness, filth, and starvation, shall no longer exist; and when ignorance, sickly sentimentalism, or pseudo-humanitarianism shall no longer be allowed to stand in the way of prevention of scourges like small-pox and syphilis. With finer physique, finer teeth will appear; and in presence of the fact that man is steadily gaining more and more the

conscious power of moulding his physical future, it seems absurd to suggest that in the end there can be evolved a toothless race. Our concern is, however, more urgently with the present than the future, and if we cannot help materially towards the production of sound dental tissues in our time, we can at least do much to prevent their decay, and do more to repair them when decayed.

Vitiation of the secretions of the mouth, a predisposing as well as the direct cause of caries, has not been hitherto exhaustively investigated. This, not so difficult a subject as the last mentioned, is equally important. If we were fully acquainted with the chemistry of the oral fluids in disease, more certain methods might be devised to prevent those changes which lead to the formation of acid and give rise to putrefaction and fermentation in the vicinity of the teeth.

Our knowledge of the process of disintegration of enamel and dentine in caries is almost complete, yet new facts might probably be of further practical value. The principles of treatment, the right method of preparing and stopping simple cavities, were empirically established many years before the physiology of the tissues was understood, and it is hardly possible that those principles can be overthrown. But instruments, materials for stopping, and methods of working them may be improved. The mechanical genius of our members

may find, and does find, exercise in improving our present instruments and in devising new ones. This in itself is a large subject, and very attractive; but I must not now dwell upon it.

There is vast scope for scientific work to be directed towards the improvement of materials for stopping. For these we are too much dependent upon manufacturers, many of whom, there seems reason to fear, are imperfectly acquainted with the chemistry of the compounds which they prepare. A thorough research into the metallurgy of gold might lead to the production of foils capable of more rapid and certain manipulation than those with which we are now supplied. But of much greater importance than the improvement of gold do I hold the improvement of amalgams and all the class of plastic fillings. I need not enlarge upon the superlative beauty of gold stoppings from an artistic point of view, nor emphasise the fact that the dentist who has made himself a first rate gold-stopper has mastered the greatest difficulty of his craft; and that to him no other operation will appear hard or laborious. But to insist upon gold stoppings for every case in which this material could be fitly used would be about as reasonable as to prescribe a warm winter climate for every case of incipient phthisis in which it might be beneficial. Gold fillings for carious teeth, like warm winter climates, must be considered as luxuries beyond

the reach of the vast majority of sufferers, and those most needing relief; they are too costly. Besides this, gold fillings involve the infliction of pain and fatigue which cannot be borne by every patient.

It was once the fashion of a certain class of writers to denounce the use of amalgams as a species of malpraxis approaching crime; and dire were the injurious effects ascribed to these substances. These prejudices were based upon impressions which had no scientific foundation, and it is not necessary to again expose their falsity. An ideal filling would, however, not be metallic. It would be a cement which, applicable in a condition thoroughly plastic and adhesive to the walls of the cavity, would, on setting, approximate in its character to dense enamel. The advances which have been made in preparation of non-metallic cements go to show that it is not beyond the power of chemistry to produce such a material.

Simple caries and the operation of filling by which it is treated are peculiar, there is nothing quite like them in general pathology and surgery; but when we turn to the inflammatory conditions occurring within and around the teeth we tread more common ground; for the processes of inflammation, modified only by the anatomical peculiarities of the part, are essentially the same in all vascular structures. In the case of the teeth

we have such facts to consider as that the pulp is confined within the rigid walls of a chamber which allows neither of swelling, nor of the escape of exudations; that lesions of the hard tissues are incapable of natural repair; that an exposed pulp does not tend to heal and cicatrize, and therefore, if it is to be preserved, needs to be hermetically sealed beneath an artificial covering. Except in cases where the cavity is readily accessible and bounded by strong walls of sound tissue, it seems questionable whether it may not be better to destroy a diseased pulp and extirpate it rather than attempt to save it, seeing how easily the operation may be performed, and how well the teeth endure after antiseptic treatment.

A disease which seems greatly on the increase at the present day, and which is the sole existing opprobrium of dentistry, calls urgently for investigation. Of its etiology and pathology we are almost completely ignorant, and its treatment is proportionally unsatisfactory. I allude to the malady which consists of slow wasting of the sockets, and loosening and shedding of the teeth, and which is commonly designated *pyorrhœa alveolaris*. I have formed the opinion that cases of this affection may be grouped into three classes, and that they are closely analogous to varieties of diseases of the hair commonly classed under the term "baldness."

In one variety, there is little or no inflammation or discharge until the final stage; and the cases occur mostly in robust healthy individuals, although very often of the gouty diathesis, and with massive well-formed jaws and teeth free from caries. These cases are like those of simple premature baldness. In a second group there is present either general debility, or one or another of the dyscrasiæ such as are so often associated with alopecia. A third class of cases resembles sycosis—although I do not suggest that their etiology is identical—and these are the cases of true *pyorrhœa alveolaris*. I have long made this comparison between this disease and affections of the hair, and I was much interested to learn lately that a similar analogy had been drawn by Mr. Jonathan Hutchinson.

Among other topics worthy of full discussion to which I am tempted to refer, but to which time allows me only to allude, antisepticism as applied in dental surgery might well occupy a lengthy essay. I must not, however, pass beyond my purpose, which is to suggest how extensive are the fields for our labour.

Dentistry does not, like general surgery, involve direct issues of life and death, but, nevertheless, the theories at the base of each are identical. The art of surgery was for ages founded in greater part on empirical knowledge, that is, knowledge

derived solely from experience, and neither explicable nor verifiable by the imperfect science of the day. That error should flourish, and that progress under such conditions should be halting and uncertain, need excite no wonder. We all, on the other hand, can review the epoch-making discoveries—the outcome of true knowledge—by which, from time to time, long and sure strides in advance were made possible. Indeed, the history of the healing art in every department, and not much less in dentistry than elsewhere, brings out in bright relief the fact that practice can have little permanent growth unless based upon the sure foundation of demonstrated truth; and can advance only with the general advance of natural science. Never was the prospect of improvement more hopeful than it is now, and in view of the wonderful progress which has been made within our own times in the investigation of every class of natural phenomena, it cannot be believed that any of the problems in dental science which remain unexplained will continue for ever insolvable. It would be rash indeed to ascribe limitations in any direction to future scientific achievement. For instance, we ourselves have seen chemistry advance by rapid steps to a position in which the growing wonders of synthesis no longer surprise us, so that we are prepared to take as a matter of course the artificial production

in the laboratory of any definite chemical compound found in the organic world.

In physiology we have witnessed, as a crowning marvel, localisation of the functions of the brain and almost complete unravelment of that tangled web, the nervous system.

In etiology and pathology the study of micro-organisms has been surely leading to great results, and the fundamental fact has been established that the processes of fermentation and putrefaction, which were formerly looked upon as of purely chemical character, are essentially connected with certain low forms of organisms.

These discoveries in their turn have led to the science of bacteriology, which has made of surgery a modern miracle. Passing from the time when such operations as trephining and abdominal section were very frequently fatal, we have seen arrive the day when the surgeon, almost certain of the result, no longer hesitates to act, because of the intrinsic danger of any operation, and when he does not shrink from opening the cranial cavity and searching for and removing the cause of disease from within the substance of the brain itself.

Science, by which alone such achievements have been made facile, can advance only by means of observation and experiment; but observation and experiment must be exact; the record of

mere impressions, unverified by instruments of precision, by balance, thermometer, microscope, and test-tube, are, as a rule, worse than worthless. He who in the investigation of phenomena accepts the evidence of his unaided senses can never form a true conception of the nature of things. No sense, for instance, is more easily deceived than sight, and to trust to that alone is to believe in a host of falsehoods, among which that the sun revolves around the earth will be far from the most preposterous. Healthy scepticism is the only safe habitude for the scientific intellect; it is that which every scientific explorer, worthy the name, cultivates within himself and expects to find in others. There is no shame in occasional error. The pithy phrase in the American Minister's farewell speech at the Mansion House a few days ago, applies as forcibly to the pursuit of science as to any other work of life—"the man who makes no mistake does not usually make anything."

In the promotion of scientific progress, exposure of old error thus stands in importance second only to demonstration of new truth; and, therefore, workers who may find it difficult to take up a fresh line of research may yet perform good service by examining the facts and theories of others, and subjecting their statements to searching criticism and discussion. If the future of

biological science is full of promise, it is mainly because every new statement is forthwith submitted to examination; progress was formerly long delayed for want of careful sifting of the evidence on which generalisations were formulated, and because the testimony of a great authority was often accepted without doubt or question.

For great results, such as I have exemplified, science must not be pursued in a spirit of narrow utilitarianism. The worker must not be perpetually asking what is the practical good of this or that fact; to elicit truth for truth's sake must be his main desire, and he must be satisfied by the reflection that there never was yet established a single fact, useless and isolated as it might at first appear, which did not in the end fall into its place as an indispensable atom in the sum of knowledge upon which advancement depends. The cultivation of science in this the only fruitful way calls for devotion and self-sacrifice; in any worldly sense it is rarely remunerative, and seldom brings, at least in this country, either applause or popularity. Indeed, until quite recent years, it would have been impossible to refute the allegation that the people of this nation were, compared to the French and Germans, grossly unappreciative of the value of science; and it must seem scarcely credible to the rising generation that it is only within the last decade or two

that science has been afforded a place in our general educational system, and has secured the position to which it is entitled in our ancient Universities.

Scientific research can rarely be done to order; no superlatively great work in science, art, or literature was ever produced under such conditions. Great genius can neither be tempted by wealth nor turned from its bent by anything short of starvation and death. How many martyrs to science the years produce—men whose lives are silently given up and sacrificed in the service of humanity—the world knows not, and seems to care not. That some do so perish is beyond a doubt; but it is indeed difficult to suggest a remedy, almost impossible to conceive a scheme, not entirely Utopian, whereby developing genius might be recognised, and, being recognised, might be cared for and guarded at the public charge. Nothing, for example, more clearly comes out in the biography of Darwin than the fact that had he not possessed resources which not only placed him beyond the reach of want, but enabled him to husband his feeble strength and concentrate all his powers on the gigantic tasks which he set himself to perform, the world would not have been enriched by more than a fragment of the store of knowledge which he at last bequeathed.

It is impossible to make the great body of the

people understand the purpose or utility of abstract science, or to recognise merit in those who labour at it. They cannot comprehend the object of a life devoted to accumulation of facts which seem to have no relation to any utilitarian purpose. It would be pretty safe to affirm that whilst thousands might be found who would regard as somewhat of a hero the proprietor of a quack medicine—the possessor of wealth which is the spoil of systematic falsehood and fraud—it would be impossible to find many individuals in any class of society acquainted with the names, much less the work, of contemporary men of science upon the accomplishment of whose tasks the world's forward movement depends. Whilst, however, genius of the highest order is very rare, talent and industry are comparatively common, and the question how best to help investigators to pursue lines of research for which they may have displayed fitness is at length assuming more and more prominence. The question will probably be solved by the methods already started, namely, endowment of research by individuals and institutions, to be followed, when public opinion demands it, by the State. We may trust that the day is not far distant when this Society and its kindred institution, the British Dental Association, shall find it possible to take part in these beneficent projects. In the meantime, although foolish

legislation may hamper investigation, and labourers be discouraged by the world's ingratitude and neglect, there is no need to fear that the good work will be checked, or that less will be accomplished now than in the past when difficulties were even greater. Since culture first existed among the British race there never was a time when some of the foremost intellects of the whole world, in every department of thought were not numbered among the inhabitants of these islands; and there never was a time when crowds of eager helpers were not forthcoming. It seems to me a matter for congratulation, that so long as dentistry has held a place as a profession in this country, it has always included in its ranks a due proportion of men of general scientific reputation; and that, besides those among us to-day whom we all know as deserving distinction, we claim among the limited numbers of this Society not less than three members whose labours have gained for them the most coveted of all similar honours—the best testimony in the world to the true value of their work—the Fellowship of the Royal Society. Those who have entered our Profession and joined our Society at the present time possess advantages for acquiring knowledge and for pursuing science greater than ever existed. We know they are animated by the same spirit that possessed those toilers after truth to whose example I have referred. Let me express

the hope that some fruits of their labour may be laid before the Society during the session in which it is to be my high honour to occupy the Presidential Chair.

The PRESIDENT then said that he had the pleasure of stating that he had received promises of papers to be read before the Society by a number of distinguished men, which would, he believed, occupy almost every evening when he would be called upon to fill the Presidential Chair.

The usual votes of thanks were then put, and the President announced that the next Meeting would take place on March 4th, when Mr. R. Hall Woodhouse would open a discussion on Antisepticism in Dental Surgery, and Mr. J. Bland Sutton would read a paper upon the "Relation of Rickets to certain Odontomes."

The Meeting then adjourned.

Woodburytype.

ALFRED J. WOODHOUSE, L.D.S., Eng.,

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

March 4th, 1889.

MR. HENRY SEWILL, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

The Minutes of the preceding meeting having been read and confirmed,

MESSRS. ARTHUR T. CROWTHER, L.D.S., 74, Mortimer Street; ALFRED BARNARD, L.D.S., Rostherne, Upper Richmond Road, Putney; were elected Resident, and MESSRS. WILLIAM R. ACKLAND, M.R.C.S., L.D.S., 5, Rodney Place, Clifton, Bristol; W. A. RHODES, L.D.S.I., Cambridge; W. BREWARD NEALE, L.D.S.I., Birmingham; GEORGE OLIVER RICHARDS, M.R.C.S., L.D.S., Onslow House, The Green, Richmond, were elected Non-resident Members.

The LIBRARIAN (MR. ASHLEY GIBBINGS) announced that Messrs. Claudius Ash & Sons had presented to the Society's Library a parchment relating to a patent granted in the 31st year of the reign of George the Third to Nicholas Dubois de Chemant, of Paris, for the manufacture of mineral teeth.

The PRESIDENT then called upon Mr. Howard Mummery for his communication.

A young lady, aged fourteen, wearing a lower regulation plate, came to me in January, to have it adjusted. When I saw her she told me that while standing on the doorstep she felt something come loose in her mouth, like a piece of gum. On looking into the mouth I saw a small pendulous piece,

apparently of gum tissue, hanging from the alveolar margin of the upper jaw, over the position of the unerupted left upper second molar.

My first impression was that the gum being slightly tumid over the coming tooth, she had detached a piece by biting upon the capping of the regulation plate; but I found that this capping was separated by a considerable interval from the upper gum when the mouth was closed.

The pendulous portion was about half an inch long, and caused considerable discomfort. I therefore divided it with a pair of scissors, but the patient giving a slight start, I failed to cut it off quite close; so seizing the small piece that was left with a pair of plugging pliers, I found it drew out from the gum, leaving a slight depression.

On examining the piece first removed, I felt something hard at the end of it, which proved to be a small nodule of calcified tissue, in shape very much like an acorn. Under a low power of the microscope, it exhibited the appearance shown in the diagram, which I copied from a drawing made at the time.

The stalk of the nodule consisted, histologically, of the ordinary elements of gum tissue, and was firmly adherent, as shown in the diagram, to a loose capsule or sac, which in its turn was continuous with the calcified nodule and formed with an elevated ring of calcified tissue surrounding the nodule—the cup of the acorn, the rest or acorn part being a rounded mass of the calcified tissue. I examined it in glycerine and water, and by the accident of the entanglement of an air bubble, detected that the nodule was covered with a very delicate membrane continuous with the capsule.

After making drawings from it in different positions, it being too minute to section in any other way, it was decalcified in a weak acid solution and examined carefully at intervals to detect if there was any enamel which might be destroyed by the action of the acid. When softened sufficiently for cutting, there was no *débris* of disintegrated enamel, and the whole nodule was uniformly softened. It was embedded in

paraffin and lard and sections cut with the microtome; these sections were not very satisfactory, as the minute size and rounded shape of the specimen made it very difficult to keep it steady in the embedding material.

The sections stained with hæmatoxylin show a radiating arrangement of dentinal tubules, and a thin peripheral layer in parts of cementum, with numerous lacunæ: this portion corresponding apparently to the ring of calcified tissue at the edge of the part I have called the acorn cup.

× 12.

It appears therefore to be an odontome connected developmentally with the tooth papilla and follicle, no enamel being present, but only dentine and cementum. Its position is somewhat puzzling, as it is very difficult to understand how it came to be connected with the pedicle in this peculiar manner, and why it became detached. It was apparently liberated by the commencing eruption of the second molar,

the outer one-third of the crown of which was distinctly visible a week afterwards. So far as the structure of the second molar can now be seen, it is a perfectly normal tooth.

In Wedl's Atlas of the Pathology of the Teeth two nodules are described which fitted like caps on to the crowns of lower molar teeth, but these were composed in great part of enamel consisting of that tissue and dentine intricately blended, and showing no well-developed cementum. In the present instance, owing to the absence of enamel, one would imagine that it had not occupied a similar position, as at first seemed probable, it being apparently liberated by the commencing eruption of the second molar tooth. I believe it is rare to find these abnormal growths connected with the upper teeth in man.

I have seen the case again to-day, and the patient said that on Friday last another piece fell into the mouth in the same manner; but she was unable to come to me at once; she therefore pushed the little piece up again, and thought it had remained there, but to my disappointment there was no trace of it to-day—it had probably become detached and swallowed. The tooth, however, is now fully erupted. She described this piece as feeling in the mouth exactly like the first, and about the same length. If it was a similar nodule (as one would imagine from her description), the two seem to have been situated one on each side of the erupting molar.

Mr. W. A. Maggs showed a good specimen of intrinsic calcification of the pulp in a left lower wisdom tooth. The calcification was not quite complete towards its superior surface, and it might fairly be called a "pulp stone."

The tooth was much decayed, and severe and persistent neuralgia of that side of the face led to its removal. Mr. Maggs presented the tooth to the Museum.

Mr. Ackery was of opinion, from examination of Mr. Maggs' specimen, that it resembled more a case of invagination of the dentinal tissue than a calcification of the pulp. It would be very interesting if other members gave their views upon the

subject. Of course the only way to settle the question was an appeal to the microscope.

Mr. F. J. Bennett was about to make a similar remark. Mr. Maggs' specimen was a case of induplication of the fang, and if a cross-cut were made of the tooth, the real nature of the disease would become apparent.

The President: As Mr. Maggs has kindly presented the specimen to the Society, it would be well that an examination be made, and I therefore suggest that Messrs. Maggs, Ackery, and Bennett be constituted into a sub-committee to investigate the matter and give the Society a report at our next meeting.

The President then called upon Mr. H. Lloyd Williams for his communication on "A Case of Salivary Calculus."

Mr. Lloyd Williams said: The calculus I have the honour of showing this evening was extracted from the mouth of a strong healthy man, æt. twenty-eight, on the 18th February.

The man came to my friend Dr. Clark, of Luton, complaining of a small swelling beneath the left angle of the jaw; and that whenever he sat down to eat, or even smelt any savoury food, the swelling would increase to several times its former size, and become very painful. He had suffered in this manner for four years, had consulted several medical men, and had even visited one hospital without relief; he was several times advised to have the tumour excised.

To test the man's statement regarding the swelling, an apple was given him; even at the sight of it the swelling commenced to increase, and while it was being eaten reached a size several times larger than previously.

On inspecting the mouth, the only apparent symptom was that the left sublingual gland was more prominent than the right. On careful bimanual examination a slight hardness was felt in the floor of the mouth, but on account of the inflammatory thickening of the surrounding tissues it was impossible to clearly define the limits of the calculus. By

placing one finger firmly on the floor of the month in front of the seat of the calculus, and pressing upwards and forwards from behind, it was possible to see a small portion through the mucous membrane.

Whilst I held aside the tongue Dr. Clark cut down upon the calculus and picked it out with a small dissecting forceps. The small piece was broken off during one attempt at extraction. The foreign body was somewhat deeper than we had expected.

Its direction and its shape induce me to think that the growth of these calculi is similar to that of calculus on the tooth. There is first a nucleus formed—generally, I think, at the bend where the duct turns to end on the summit of its papilla; afterwards growth takes place by addition to its side and posterior extremity.

The PRESIDENT then called upon Mr. R. H. Woodhouse to open the discussion upon "Antisepticism in Dental Surgery."

Antisepticism in Dental Surgery.

By Robert Hall Woodhouse, M.R.C.S., L.S.A., L.D.S.

Gentlemen,

I have been requested by our President to introduce for discussion this evening the subject of antiseptics. When I thought over this subject, I soon began to realize that, great as has been the research already made in the science of antiseptics and bacteriology, we can at present consider ourselves as treading but the fringe-work of a new science, which promises in turn to complete as great a revolution in medical science and treatment as that which followed the great discovery of the renowned William Harvey, now more than two-and-a-half centuries ago. My endeavour, however, must be to briefly allude to these discoveries, and consider them only in the light of their application to the routine of our daily practice as dental surgeons.

To the science of bacteriology, and those who have worked in it so assiduously, our profession owes an immense debt of gratitude, as it has let in a flood of light on the *rationale* of our treat-

ment. It enables us to pursue with greater precision and definite aim our treatment in many operations that formerly baffled the dental surgeon; notably those connected with exposed pulps and septic root canals, with regard to both of which conditions I wish more especially to speak this evening.

Co-existent with special localized treatment of the teeth, too great stress cannot, of course, be laid on the general treatment of the oral cavity. The environment of the teeth is all-important; the most skilful operations may, and often do, fail, from neglecting some simple general treatment which tends to counteract a condition of sepsis in and around the sockets of the teeth. The patient needs to be educated to co-operate with the dentist to get the best results in this respect. As stated by Professor Miller, of Berlin, "before all antiseptic or alkaline washes come the toothbrush, toothpick, and floss silk."

It is not, however, specially with these auxiliary antiseptics, as they may be termed, and important though they may be, that I have now to deal, but with germicides proper. A true antiseptic has been defined as that which prevents putrefaction by virtue of its action in arresting the growth of organisms, or destroying these, or the chemical activity of certain substances which give rise to fermentation or decomposition. The patent fang

of a tooth, with its surroundings of high temperature, food, and water supply, forms an excellent incubator of bacteria, and when neglected is very much like a minute tropical swamp. When the right treatment, however, is adopted, the bacteria are taken at a disadvantage and a condition can soon be produced which renders further multiplication impossible, by removal of the pabulum from which they are nurtured. How far the micro-organisms extend up the dentinal tubuli, *beyond* the limit of decalcified bone, I am not prepared to say; my impression is that they do not so extend, or, at all events, if they do extend to some slight extent, such powerful drugs as the perchloride or iodide of mercury are well calculated to overtake them and stay their destructive progress.

In the introduction to the new edition of his *Materia Medica*, Dr. Mitchell Bruce says, in speaking of drugs generally, that the number used from time immemorial is enormous, and comparatively few are now believed to be really useful. As dentists we may, I think, with advantage note his statement. To simply enumerate all the drugs that have been recommended for their antiseptic action alone in connection with the teeth, and poured in and around them in various proportions and combinations, would be a task more tedious than profitable. We must dwell

more especially on the principles which underlie their general action, and the conditions which need their application. In a recent copy of one of our dental periodicals I noticed a very comprehensive germicide prescription, and recommended for fang-filling. It contained the following:— β naphthol, iodol, carbolic acid, menthol, eugenol, ozonic ether, and chloroform. Such a combination as this might well strike terror into the most hardy of micrococci. It reminded me of a sketch I once saw of an old gentleman who, after an unsuccessful day's angling, in disgust threw into the river his book of flies, with the remark, "There—take your choice!"

In dental operations it is of great importance, not only to use every artifice to destroy micro-organisms, but also to produce a condition of the mouth which allows no quiet resting-places for this nomadic and prolific race. Whether contour fillings or free divisions be adopted, this should equally be borne in mind.

Professor Miller of Berlin, in a list of germicides, places the relative powers of well-known agents in preventing the development of fungi, or producing an acid reaction in sweetened saliva, in the following order:—

Perchloride of mercury ..	1 in 100,000
Peroxide of hydrogen ..	1 in 50,000
Iodoform	1 in 6,000

Salicylic acid	1 in	2,000
Eucalyptus oil	1 in	1,600
Carbolic acid	1 in	1,500
Oxide of zinc	1 in	1,250
Permanganate of potash ..	1 in	1,000
Listerine	1 in	120

The active ingredients of listerine are benzoic acid, borax, boric acid, and thymol.

To this list I may add boric acid, a solution of 1 in 800 of which will, it is stated, prevent the development of anthrax bacilli. I have found this preparation in the form of boroglyceride most useful in disease of the antrum, or as a mouth-wash after the extraction of teeth.

The red iodide of mercury, which is soluble in an excess of iodide of potassium, is stated to be at least twice as powerful an antiseptic as the perchloride of mercury. I have used it 1 in 500, and also 1 in 100 in solution. Cases of dead teeth have gone on well, but I have not employed the preparations of mercury for a sufficient length of time to speak very definitely of my own experience, and shall be especially glad therefore to hear that of others. The iodide of mercury is the form in which the drug is now being used internally as a germicide in zymotic fevers, and success has been claimed for it in many instances. In speaking of antiseptics generally, I ought perhaps to allude to probably the most popular of all, viz., tobacco.

Its effect on the teeth—in moderation, of course—I believe to be beneficial. Possibly if it were understood that its use tended to a lessening of dental fees, the parental veto with regard to this plant might sometimes be modified.

The antiseptics I generally use in my own practice are eucalyptus oil, iodoform, carbolic acid, listerine, and oxide of zinc. The latter substance is, I believe, of immense value in proper combination with carbolic acid for conservative treatment of the dental pulp—in fact I look upon it as my sheet-anchor, a careful selection of the cases in which it is used very rarely resulting in failure by death of the nerve or in discomfort to the patient. In very badly decayed teeth of children, where the nerve is *not* exposed, but has only impoverished bone over it, I use this preparation. I remove the greater part of the decay at the first sitting and place a thick layer of the oxide and carbolic acid, eighty per cent. with eau de Cologne formed into a thin paste, over the floor of the cavity; I leave this for a week or so, when the tooth can be more carefully excavated and filled with Sullivan's cement or osteo. I trust to this same preparation in adult teeth where exposure has taken place, and when, from objective or subjective symptoms, it has been decided that the nerve is presumed to be healthy and will warrant conservative treatment. It is, I believe,

due to the care exercised in the selection of such cases, and suitability of position for applying agents, that credit or discredit is brought upon this class of operation. Although, no doubt, it is better to leave at times a little impoverished bone over the nerve, rather than expose it, I am, even with the aid of antiseptics, very chary of leaving decay under such circumstances. Absolute isolation from the fluids of the mouth alone will prevent the progress of decalcification in such a position as this. The power of an antiseptic becomes spent, and any accident to or wearing away of the filling would immediately light up the activity of the decay with probably the worst results to the nerve. In arguing thus, I am not unmindful that in some positions in the mouth superficial decay may in hard teeth be non-progressive for a length of time. The removal of teeth, and the consequent lessening of crowding, will often produce this result and greatly retard pre-existing decay; but where the dentine has been invaded by decay, my experience is that it must be removed by either polishing or stopping, as no antiseptic will be of avail if the fluids of the mouth still have access. Where there has been severe toothache, periodical, or persistent in character, and presumably indicating disorganization of the nerve structure, I do not attempt to save the nerve, nor do I believe that any application or

antiseptic yet discovered will enable us to do so with safety, except perhaps in rare instances. I may here say that my belief in amputating the diseased portion of the nerve, as I have seen recommended, is no greater than that of digesting away the diseased portion with pepsin porci. In a favourable case of exposure, the exposure being slight, and from, say, a traumatic cause, I as soon as possible touch the spot with strong carbolic acid—if it is slightly warmed, so much the better for relieving the pain. The anodyne character of carbolic is, I think, in cases of this kind, apart from any antiseptic property, that which places it in the very first rank. After any pain and bleeding have ceased, I pass over the point of exposure very lightly a thin paste of the oxide of zinc and carbolic acid, conveyed on a pellet of cotton-wool; over this I place a layer of vegetable parchment, or fine blotting-paper, covered also with a rather thicker film of the paste; I complete the operation with an oxychloride filling, the first layer near the nerve being very thin, and, of course, placed in position with a minimum amount of pressure, nothing being more fatal to a capped nerve than pressure. The oxychloride I find best is Ash's rock cement, the grain of which is extremely fine, and it sets with reasonable rapidity.

Should it be found necessary to destroy a nerve and remove it, I fill the extremity of the fang with

the same preparation of oxide of zinc and carbolic, using a few fibres of cotton-wool, or pumping it up the canal if extremely minute. I believe in such cases—and in such cases only—in what is called immediate root-filling, the fangs being necessarily in an aseptic condition. The larger part of the root-canal and nerve cavity, when it is not used as a retaining point for anchoring the filling of the crown, I fill with chloroform and gutta-percha. If anything then goes wrong with the filling, the fang remains healthy.

It is in commencing the treatment of root canals in dead and neglected teeth that I believe the preparations of mercury are most useful, as I think they probably have a greater penetrating power on remote portions of the dentinal canal where it has been invaded by microbes. So far, I have found the preparations of mercury less liable to stir up a dormant abscess at a root of a tooth, carbolic—from, I suppose, its property of coagulating albumen so readily—being specially liable to do this, either by passing through the apical foramen, or plugging it up with coagula, and so arresting any discharge that may have been taking place into the canal. Mercury is not a deodorant; it does not at first have an appreciable effect on the offensive and characteristic odour of dead teeth; but I take it that its action in preventing the multiplication of bacteria is not to be discredited by this. As a

deodorant, after carefully opening up and washing out the nerve canals, I use an application of eucalyptus oil. In the treatment of dead teeth I think all will agree that they have some failures, or at least but partial successes. I have frequently seen gum-boils which have disappeared at the roots of dead teeth, when treated antiseptically, reappear after a time; this I believe must be due often to a reabsorption back into the root canal and decomposition ensuing. The after-success and comfort of dead teeth is in pretty direct proportion to the care and choice of substance with which the fangs are filled. Theoretically the old plan of filling at least the apex of the fang with gold was a good one, but from the difficulty and danger of attempting it, except in very favourable cases, it has, I fancy, fallen into general disuse. Of the method of applying antiseptics, I have said but little. The importance of using the rubber-dam is obvious when such strong applications are being used—besides, it enables cavities to be made perfectly dry, and isolated from the rest of the mouth.

I have, I feel, only alluded in a passing way to the various phases of this question, speaking of bacteria only in general terms, but the instructions received from our President were to introduce this subject for your discussion. I therefore await with interest the various expressions of opinion, well knowing that amongst the members of our Society

are many able microscopists, and observers, who have gone far more deeply into the question of antiseptics than I for a moment can claim to have done.

Discussion.

The President said: I am sure all will agree that Mr. Woodhouse has most ably opened this discussion, and has earned the thanks of the Society.

A discussion on antisepticism may probably with advantage be opened periodically at our Society, and I trust this is only the first of an annual series. The general principles upon which the method is based, the chemistry of the agents employed, and the special technicalities of antisepticism in dental operations—all these form topics of which the interest will continue to grow from year to year with the discovery and aggregation of new facts. I trust the discussion may be kept closely to the point; we need not, for instance, enter upon questions either of pathology or diagnosis. We may rather confine ourselves to examination of general principles, and discussion of the methods and means of dealing with the different phases of disease calling for antiseptic treatment within and around the teeth. I will confine myself to some few points, and before all I would draw attention to the efficacy of perchloride of mercury, the agent which experiment proves to be the most potent of all antiseptics. The objections which limit the use of this drug in general surgery do not apply to dentistry, for practically the danger of its absorption or passage into the system in any poisonous quantity does not exist. Not more than a few drops of solution is used on any single occasion—a quantity which, if absorbed or swallowed, would not be harmful; but with ordinary care no more than an infinitesimal portion of the minute quantity used—if any—could possibly pass into the system.

The special value of the perchloride is due to the fact that one thorough application of a weak solution is enough to

destroy micro-organisms; to sterilise organic matter, and put a stop at once to putrefaction and fermentation. In every case in which it is desired to render a cavity aseptic and to keep it in that condition, this drug is absolutely to be relied upon. In pulpless teeth a very much stronger solution may be used than would be safe in general surgery. I use a solution of two grains to the ounce of absolute alcohol. Where the pulp cavity and canals are putrid, such a solution acts like a charm. It is of course always desirable to avoid the risk of pumping or forcing septic material through the apices of roots in clearing them of *débris*, but the perchloride minimises this danger. The pulp cavity and nerve canals must be cautiously cleared of their contents, and during the process frequent swabbing with perchloride solution must be performed. At intervals the hot air syringe may be used. Organic particles by this means become desiccated and eagerly absorb the alcoholic solution when next pumped into the roots. This may be proved by experiment out of the mouth. A few—very often one—thorough dressing in this way will render a putrid canal fit to fill. For root fillings I use invariably absorbent cotton saturated with the perchloride solution, and with as much iodol as it will take up, shred after shred being tightly packed in, and evaporation of the spirit being hastened by the use of the hot air syringe. The pulp cavity and nerve canals I seal, as a rule, with "Fossiline," carried in with a few fibres of absorbent cotton. I am strongly opposed to the practice of filling roots—with rare exceptions—with metal, and I have now had experience over enough years to enable me to be positive the principles of the treatment described are sound. For many years I have used absolute alcohol—indeed, I must credit myself with its introduction into dental practice. Before perchloride of mercury and iodol I employed iodoform, and before that oxychloride of zinc. This treatment tested by time has been successful, in spite of the fact that I am by no means what is called a good operator, having not a trace of that innate endowment which provides for its owner obedient and easily educated fingers.

Mr. F. J. Bennett: Sir, the pleasure we have derived from the introduction of this discussion has been very great. Indeed we know Mr. Woodhouse as such a practical man that any remarks he might make would be sure to receive our careful attention. I am especially glad to hear his remarks in regard to capping the pulp It has always appeared to me, in exposure of the pulp, that in many cases before we reach the pulp we find it is disorganized. In my own experience I have found that the plan Mr. Woodhouse advocates, or a similar one, has been most successful. My colleague, Mr. Forsyth, has used oxide of zinc and oil of cloves for capping, and has finally filled the tooth with osteo.

With regard to drugs that are favourites, I know that perchloride of mercury is the most powerful we have. but I think we should distinguish between a good germicide and what suits our own particular case. As I found a purely alcoholic solution evaporated too rapidly, I have therefore employed 2 grains perchloride, ʒij rect. spirit, ʒvj distilled water. A very valuable use of perchloride of mercury—which, by the way, Mr. Woodhouse did not refer to—is in sterilizing instruments. I have used eucalyptus oil, and latterly I have been recommended to try iodol; the value of this, I believe, depends upon the amount of iodine that is set free in the canal. Iodoform, although it contains more iodine, parts with it less freely than does iodol.

Dr. Mitchell: In regard to the liberation of iodine from iodoform, the following are the means I have used to that end. Having applied iodoform to the cavity on cotton-wool dipped in alcohol, I force hot air through the cotton-wool from my hot-air syringe—which has a $\frac{1}{16}$th inch opening—supplied with hot air from a Bunsen; by that means I get the benefit of the iodine in the roots, not accessible by other means.

The President: I do not wish to set the bad example of speaking twice, but I ought to have remarked that absolute alcohol has the effect of desiccating the particles, which on a second swabbing take up the solution and become sterilized.

Mr. W. J. England: I was indebted some four-and-a-half

years ago to Mr. Hern for the recommendation of perchloride of mercury as a dressing. You can carry your cotton-wool saturated with it quite well on a Donaldson to the canal. Mr. Bennett need have no fear of its drying too quickly: it will take two minutes at least. I use a strong solution of five grains to the ounce. On evaporation taking place, perchloride of mercury is left in the form of fine powder on the canal walls and wool, which may then safely be left to argue the question with any bacteria that may happen to come that way. Lately I have used iodol in preference to iodoform because it is not so objectionable either in smell or taste, and I am not afraid of any irritation.

Mr. W. Hern: Mr. Woodhouse, I think, struck a very good note when he said, remove the coign of vantage for germs to linger in, also remove the pabulum of the micrococci. I think, Sir, that one of the best antiseptics we are possessed of is a little rotating drill and the syringe—what I may call the hydropathic treatment—first of all. I think that antiseptic drugs should only be used for the removal or purifying the very small portions of septic material that are left. After we have removed the greatest amount that we can with the drill, then wash cleanly out. Mr. Woodhouse spoke of eucalyptus; he must pardon me if I take exception to using the essential oils, because there is no affinity between oil and water, and in septic conditions moisture is very largely present. By way of illustration I may say that I have taken some micrococci and put them into water with eucalyptus oil; under the microscope these micrococci could be seen floating out of contact with the globules of eucalyptus, and enjoying themselves unharmed by their environment. For this reason I do not think essential oils are good germicides. Perchloride of mercury has been used at the hospital for some little time now, and I remember asking Mr. England to try it as a lubricant for iodoform.

I had such faith in iodoform that I was loth to part with it, and I still use it, in the same way that perchloride of mercury is used. Perchloride of mercury has a strong affinity

for water, and therefore robs the micrococci of one element of their existence, viz., moisture, and is valuable in that respect.

Mr. Betts said: I have read a note from Mr. Charters White stating that had he been able to be present he would have brought forward an antiseptic known as "Kingzett's Bactericide." I may say that in a few cases where I have not felt comfortable in filling a root with a hard substance which I could not afterwards withdraw, I have adopted the plan of drying thoroughly and then putting in cotton-wool with powdered iodoform mixed in it so that the iodine might be freely given off. When mixed with fluids the iodine is less freely given up, and also, as Mr. Hern has pointed out, thorough dryness is more favourable to the destruction of bacteria.

Mr. J. T. Browne-Mason (Exeter): I may say that ever since last August twelve months, I have always filled my roots with dry iodoform mixed in cotton-wool, and with most satisfactory results; it also admits of the advantage of being withdrawn readily if necessary. There is one point I should like explained. I had a case quite recently in which the patient complained of a taste of iodoform six months after I had put in a most successful gold-filling; it was very successful, there was no fistulous opening of any kind, and I am quite at a loss to understand where the taste came from.

Mr. C. S. Tomes: I do not wish to prolong the discussion, Sir, but one speaker after another has got up and spoken of iodoform setting free its iodine. I do not see why it should, but with iodol it is different.

Mr. Ashley Barrett: I would ask you, Sir, as you have had a large experience, how you deal with those advanced cases where the bacteria have affected the dentinal tubes. I can quite believe that the bacilli are sufficiently small to find their way into the dentinal tubes and there increase and multiply. When our treatment with antiseptics fails, may it not be due to decomposition having extended into the

walls of the canal, and microbes having penetrated the dentinal tubules?

The PRESIDENT: In the first place Mr. Arthur Underwood has clearly shown in his valuable research on caries that micro-organisms do penetrate the tubes before they become dilated by the changes of caries. I cannot, however, verify the fact, because I have not made any investigations upon this part of the subject. I do not see why, after frequent swabbing with any powerful germicide like perchloride of mercury and dressing with iodol, we should not be satisfied that all septic action has stopped in the canals. There are cases which fail where it is very difficult to make a correct diagnosis, but there are a vast number of cases of putrid teeth which we formerly could not deal with satisfactorily, and which we can now treat with almost uniform success.

MR. C. J. BOYD WALLIS: I think I was the first to introduce to the profession iodoform and iodol. They become practically iodine in their action. Iodoform alone I consider useless as a permanent root-filling. They are very readily absorbed, and very evanescent. If you fill a tooth with iodoform and open it again a short time afterwards, there is no trace of iodoform to be found. With regard to essential oils, I endorse what Mr. Hern has said. I use them as anodynes or deodorants, eugenol is the best. For capping or covering an exposed healthy nerve I believe the best thing is a solution of sulphur in ozonic ether; it is compatible alike with the nerve and dentine, and the nerve tolerates the pressure admirably. I use various preparations of naphthol, but I prefer the β naphthol. It is a powerful antiseptic, germicide, and deodorant, and so is valuable as a permanent dressing in nerve canals.

MR. HERN: I understand Mr. Boyd Wallis to say that he finds iodoform very evanescent. I do not know how long he considers "a short time." But I recently took out a filling put in in 1883, and the iodoform was as powerful as ever.

DR. CUNNINGHAM: In the discussion which has taken place to-night, it is interesting to find that the bulk of practitioners

are getting successful results from the use of antiseptic drugs. The statements seem somewhat to clash, but there is one point, viz., the extent of the practice of what we may term instrumentation, where the practitioner objects to the reaming out of canals; of course, in that case, he is obliged to use these drugs very extensively, whereas the operator who uses the dental engine for the same purpose, I think is more thorough, leaving no doubt as to how far micrococci have passed into the dental tubuli, and getting into the tissue whence he can reasonably suppose there are no micro-organisms left. I am sure that instrumentation alone, in the majority of cases, would be quite sufficient, especially if followed up by an occlusion with thorough canal dressing. I myself certainly use a perchloride of mercury solution of one per cent. in water, and instead of putting in a few drops I thoroughly syringe out several times; with the rubber-dam it is thoroughly safe.

Mr. W. H. Coffin: I really do not know what is the best thing to fill a root of a tooth with. I have tried everything. Oxide of zinc with glycerine containing one per cent. of arsenic, I find extremely good. When one has alveolar abscess to deal with, I know of nothing better than peroxide of hydrogen. Kingzett's preparation is very satisfactory, consisting of perchloride of mercury with peroxide of hydrogen, thus combining a germicide with a powerful oxidizer and deodorant.

Mr. R. H. Woodhouse, in reply, said: I think that to a great extent the remarks of many members have answered one another. With regard to what Mr. Bennett said about the oxide of zinc and oil of cloves, I still stick to it that carbolic acid is better than oil of cloves. If the nerve is exposed, the oil of cloves is useful; but if otherwise, the carbolic acid is far preferable, and has the advantage of obtunding the pain. Very few members have spoken of the iodide of mercury, the preparation to which I wished to draw attention this evening; it is one which has attracted a good deal of atten-

tion in general medicine. Dr. Mitchell spoke of introducing hot air into the cavity, but I believe no temperature under 250° is of any use for the purpose of sterilizing. Mr. Hern spoke of the advisability of opening up canals; of course we agree as to that, but perchloride of mercury will get anywhere. Mr. Browne Mason spoke of the taste of iodoform after filling; the only thing which suggests itself to me is that the taste might have come under the filling. Mr. Barrett spoke of failure in treating teeth; well, there is no doubt there are cases which seem almost impossible to cure by root treatment. Mr. Coffin's suggestion of a combination of peroxide of hydrogen and mercury seems a very useful one. I think we have all benefited by the discussion, and will most of us take away with us some useful hints.

On the Relation of Rickets to some forms of Odontomes.

By J. Bland Sutton, F.R.C.S.,
Honorary Member of the Society.

On several occasions I have exhibited to this Society under the name of *fibrous odontomes*, tumours, formed by enlarged and thickened tooth follicles, taken from the jaws of goats and from a dasyure. I also ventured the opinion that certain tumours of the mandible and antrum of the human subject were probably of this nature. It has long been known that in rickety children the teeth are late in appearing; this was attributed by Mr. Shaw* to diminution in the size of the jaws and the large size of the teeth. Some years ago I endeavoured to point out that the delay must be attributed to abnormal thickness of the follicles. That the tooth-sac should be thickened in rickety children need not surprise us, when we remember that this remarkable disease affects most particularly those membranes engaged in the production of bone, and as the tooth-sac is responsible for the cementum of the tooth, and a part at least of its alveolus, we

* Med. Chir. Trans., vols. xvii and xxvi.

should expect that in rickety mammals, including children, the follicles would be abnormally large.

In nearly all the specimens of fibrous odontomes which I have shown to the Society, the skeleton of the mammal possessing them was severely affected with rickets; in each case the tumours were multiple and symmetrical; those which occurred in the upper jaw were much larger than those found in the mandible: histologically they were composed of young fibrous tissue, with laminæ of ill-formed bone interspersed, and presenting here and there giant cells. In many cases the fangs of a well-formed tooth were embedded in the tumour, especially in those found in the upper jaw, but in those examined in the lower jaw the tooth was as a rule absent or rudimentary. The larger size and higher development of the tumours when invading the antrum is to be explained by the circumstance, that they meet with less resistance than when compressed between the two plates of the mandible.

The association of rickets and fibrous odontomes is not casual, as the following specimens will serve to show. Two young Assyrian bears were killed at the Zoological Gardens because they were deformed by rickets, and on dissection they were found to be the most rickety mammals I have ever examined. The skull bones, especially those of the vault and face—membrane-formed bones—

were greatly thickened, yet so soft that they were readily cleft by means of a stout knife. The follicles of the molar teeth, especially the last molar in each upper jaw, were greatly enlarged, and projected as rounded fibrous tumours into the orbits and zygomatic fossæ. Some notion of the thickness of the follicles may be inferred from Fig. 1. These thickened follicles resemble, in their

Fig. 1.—Portion of the skull of a rickety bear with an enlarged tooth follicle (*F*) projecting into the orbit.

naked eye characters and minute structure, the fibrous odontomes found in the jaws of the goats and the dasyure. A specimen from the bear is shown, of natural size, in Fig. 2.

The skulls of the bears exhibited the appearances typical of rickets, and one is shown in section in

Fig. 2.—An enlarged tooth-sac from a rickety bear; natural size.

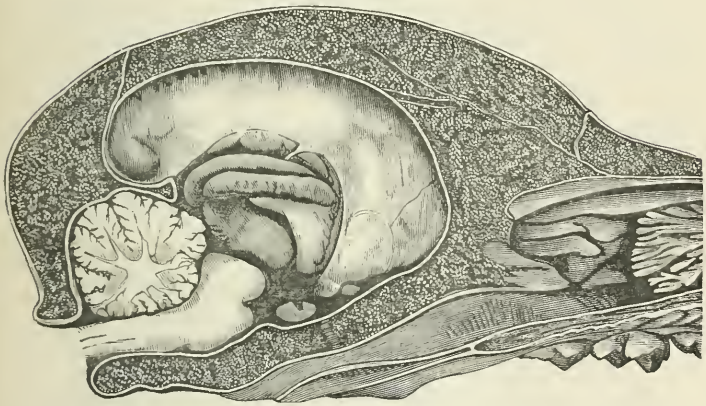

Fig. 3.—Sagittal section of the skull of a rickety bear, to show that the bones pre-formed in membrane are those chiefly affected.

Fig. 3, in order to show that the enlargement affects chiefly those bones pre-formed in membrane.

These facts induced me to learn more about the history of certain tumours of the jaws preserved in the museum of the Royal College of

Surgeons. I found two specimens in that collection which clearly belong to the group we are considering.

The first specimen is thus described in the catalogue :—

"Sections of two myeloid tumours developed symmetrically in the angles of the lower jaw. Their outer surfaces are covered by the external layer of compact tissue of the bone which they have expanded and thinned."

These tumours were removed by Mr. Heath from a boy seven-and-a-half years old, with rickety legs, but he was well nourished when the tumours were removed. They began when he was a year and a half old, and increased slowly and painlessly. He had a good deal of difficulty with his teeth.

I have carefully examined these specimens and have no hesitation in pronouncing them to be overgrown tooth follicles due to rickets. It must be remembered that a few myeloid cells are not sufficient to make a myeloid sarcoma; the giant cells should make up a very large proportion of the tumour.

The long history of the case—six years—the general characters of the tumours, their symmetry, and the rickety constitution of the boy, strongly support the view that the tumours in this case are of the same nature as those in the bears,

goats, and dasyure. The curious square-shaped look of the boy's face, as shown in Fig. 4, is very characteristic, and was strongly marked in the case of the goats'.*

Fig. 4.—The boy with symmetrical tumours of the mandible described in the text (after Heath).

There is a somewhat similar specimen in the same collection presented by Mr. F. Smith. It is thus described in the catalogue :—

"A portion of the inferior maxilla from near the symphysis, within which lies a fibro-sarcoma surrounded by a thin shell of bone consisting of the expanded walls of the jaws. The tumour is removed from the section in order to expose a small irregular mass projecting into the upper part of the cavity, and having the appearance of a misplaced, ill-developed denticle. The tumour

* For complete details the student may consult Heath's "Injuries and Diseases of the Jaws."

was firmly attached to this body by fibrous tissue, but was loosely connected with its bony capsule. It consisted microscopically of spindle cells and nuclei, developed in places into ill-formed fibrous tissue."

The general characters and minute structure of this tumour in my opinion proclaim it to be an overgrown tooth follicle.

The view that tooth follicles, enlarged and thickened by rickety changes, may become later in life hard odontomes, need not surprise us. The long bones in the progressive stage of rickets are very soft, and may be cut with an ordinary knife. Should the child recover, these thickened and soft bones become as hard and dense as ivory. It is far from my purpose to insist that all odontomes are to be attributed to rickety changes in the follicles; but that rickets is responsible for some soft and some hard varieties seems very probable. I also had in view the fact that the study of what is called Comparative Pathology will, if persistently followed, throw much light on obscure morbid conditions in man, and the nature of odontomes is one of them.

Discussion.

The President: Mr. Bland Sutton may be said to be a scientific explorer. His valuable and interesting papers here, and his lectures at the Royal College of Surgeons, embodying, as they do, the result of his investigations, invariably contain much that is new to us, and there is not the least doubt that valuable generalizations will arise from his studies. We all recognize Mr. Sutton as an important member of the scientific world. But because his papers either contain fresh discoveries, or throw entirely new light upon our present knowledge, we find it somewhat difficult to discuss them without time to digest them. There are, however, many members of our Society who are capable of discussing them, and I hope we may have a good discussion to-night.

Mr. C. S. Tomes: I believe, Sir, that the observation that Mr. Bland Sutton has made is the outcome of several years' reflection and investigation. I recollect some questions he asked me some years ago as to alterations in tooth follicle that take place in rickets. This observation is an absolutely original one; I do not remember anywhere to have seen any allusion of the kind: and it is one the value of which to pathology is very obvious. There is one matter that I should like to make a remark upon. Mr. Sutton says that he has carried a little further in point of classification and that the specimen would form what we understand by an odontome. Looking at the specimen it does not seem to me that it would. It seems to me, looking at the specimen, that the tooth tissue, so far as the dentine and enamel are concerned, is unaltered, and that had further calcification gone on the result would have been hypertrophy and cementum. Odontomes seem to resemble only partially the ordinary tooth

form. So that being further calcified the tumours would not correspond quite to any form of odontome that we are familiar with.

With reference to Mr. Mummery's specimen, it is a very curious little body. I had the opportunity of seeing it when it was fresh, and it is a little difficult to understand how it erupted. There is one point to which Mr. Mummery has not called attention, though it was merely an oversight on his part, as he remarked it when showing the specimen to me, and that is that its pedicle is attached to the wrong end, being attached to the base of the pulp. I have nothing to say in explanation of the fact, but it is a peculiarity that if thought out may enable one to get an intelligible history of it.

Dr. Mitchell : I should like to ask Mr. Sutton if he considers this a special class of odontomes, that is, out of and beyond what we ordinarily understand odontomes to be.

Mr. F. J. Bennett : I suppose Mr. Bland Sutton would call this a cementoma. The thickening of cementum would not alter the formation of the dentine in any way.

Mr. Storer Bennett : I had not the opportunity, Sir, of seeing the specimen when it was being passed round, but without wishing to challenge Mr. Bland Sutton's description or classification—that we all know is an extremely dangerous thing to do—I should like to say that there was one point which struck me as rather peculiar. In most animals odontomes occur symmetrically, though, if not absolutely unknown, they are extremely rare in human beings. It seems to me that the question suggests itself that if these odontomes are due to rickets, why do we not get a greater number of symmetrical odontomes in rickety people ?

Mr. Paterson : I should like to ask Mr. Bland Sutton, Is it necessary for the ordinary sarcoma to contain four-fifths of myeloid cells in every case ?

The President : If no other member has any remarks to make, I will call upon Mr. Bland Sutton to reply.

Mr. Bland Sutton: Sir, Mr. Tomes is quite right when he remarks that this thing has been slumbering in my mind for some years. I think it is about eight years ago that I had the extreme pleasure of making Mr. Tomes' acquaintance, and it was over the jawbone of a rickety baboon. I asked him several questions, but Mr. Tomes, in the cautious way which should distinguish all true scientific investigators, kept an open mind upon the subject. I have been at work upon the relation of rickets to odontomes since that time. Now, odontomes which occur in animals are of two great classes: those which I call cementomata, which are due to the ossification and enlargement of the follicle, and composite odontomes due to aberrations of the whole teeth germ.

To prove that they really arise from such conditions, I had the opportunity of examining the largest that has been known in a horse. I decalcified it, and in the middle of the soft matter there was the outline of three teeth. With regard to the ill-shaped odontomes that we find in the human subject, they occur most commonly in the lower jaw, but in the classical case of Hare of Limerick, the odontome occurred in the upper jaw, and had the well-formed crown of a tooth attached to it.

When soft odontomes occur in the lower jaw of animals, they do not contain any trace of tooth substance. Had the soft tumours in the bears become calcified, we should have had a well-shaped tooth, such as we see in the human subject when the odontomes occur in the upper jaw, but in the case of the lower jaw the odontomes would have presented themselves as a shapeless mass of dentinal tissue.

With regard to the number of giant cells necessary to make a myeloid sarcoma, if our classifications are to be worth the paper they are written upon, our definitions must be sharply drawn, and therefore it is desirable to say that there must be at least four-fifths of these myeloid cells, and the tumours should have a maroon colour to make a myeloid sarcoma. It may be interesting to Mr. Paterson to know that the larger the number of these cells, the less likelihood is there of a recurrence of the tumour.

After the usual vote of thanks to contributors of communications,

The PRESIDENT announced that the next Meeting would take place April 1st, when a paper would be read by Mr. Jonathan Hutchinson, F.R.S., on "Surgical Diagnosis by the Teeth," and Mr. C. S. Tomes would contribute a Casual Communication.

The Meeting then adjourned.

ERRATUM.

Page 93, line 14, for "four" read "forty."

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

April 1st, 1889.

MR. HENRY SEWILL, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

MR. SIDNEY SPOKES, M.R.C.S., L.D.S.Ed., of 59, Queen Anne Street, was balloted for and elected a Resident Member of the Society.

The CURATOR (MR. STORER BENNETT) announced that, through the kindness of Captain Lloyd, of the Somersetshire Regiment, to whom they had been previously indebted, two specimens had been added to the collection of the Museum. The first was the skull of a black Indian bear, and the second a very interesting specimen of the skull of a Muntjac. As the Society would be aware, there were three kinds of deer—and only three—that have canine teeth, viz., the ordinary musk deer, the Chinese water deer, and the Muntjac, and these have no horns, the canine teeth taking the place of antlers. In the Muntjac they had an intermediate condition, largely developed canine teeth and also horns—a very curious condition, and one of which they had no previous specimens.

MR. WALTER H. COFFIN: I think, Sir, I am correct in saying that the Wapiti of North America has its eye teeth rudimentary. The first settlers in America called it the Elk, the real American Elk being the Moose. These eye teeth are

sometimes found afterwards by the natives, and are looked upon by them as something miraculous, passing as currency.

Mr. Storer Bennett: The Muntjac is also very peculiar in having the horn not growing from the bones of the skull as it usually does, but it has a long horny projection having a mass of true bone from which the horn springs.

The President: Messrs. Ackery, F. J. Bennett, and Maggs undertook at our last meeting to examine microscopically Mr. Maggs' specimen; the Society will be glad to receive their report.

Mr. F. J. Bennett: It will be remembered that it was suggested that the specimen you allude to might be a case of secondary dentine; however, Mr. Ackery and myself formed a slightly different opinion, viz., that it might be due to induplication of dentine itself, and a sub-committee were instructed to examine the specimen. This has been done, and I have been fortunate in duplicating the specimen. I have also made a drawing, which will be handed round, with Mr. Maggs' specimen and the duplicate. I have since looked at several specimens and found that they are not uncommon. They always appear to be second lower molar teeth, and the induplication is on the buccal surface. I think we may put this down as an induplication of dentine in a second lower molar tooth. I think, Sir, we are indebted to Mr. Maggs for bringing the case to our notice, as there are points about it which are worth while looking at.

The President then called upon Mr. Tomes for his communication.

Mr. C. S. Tomes: The case which I wish to mention is one in which epithelioma arose in the socket of a second upper molar. It had one of its roots virtually if not entirely separate from the others, viz., the palatine root was almost if not quite separate from the labial roots. Screws had been put into these and a ring put round the tooth and a large amalgam filling contoured upon it. The tooth had remained comfortable for about eighteen months from the time it was

filled. When the patient showed it to me he did so as being rather loose. I noticed that there were some rather ugly granulations round the neck of the tooth and took it out. I then found that the whole hollow socket of the tooth was occupied with granulations of epitheliomatous aspect.

I took the patient to my next-door neighbour, Mr. Christopher Heath. He said that he had not the least doubt but that it was a case of epithelioma. He suggested that an attempt should be made to destroy it with chloride of zinc paste. It was accordingly covered over by a vulcanite plate, and the paste kept in for twenty-four hours; of course that brought away some sloughs, but the raw surface was never without the appearance of epithelioma. A second attempt at destruction with the paste was made unsuccessfully, and it was then decided that some operative interference should be undertaken. The patient was also seen by Sir James Paget. Mr. Christopher Heath being ill the patient was taken to another surgeon, who was also of opinion that it was a case of epithelioma, but was averse to any operation. There was a little hardening and thickening which extended from the mucous membrane on to the cheek, and the tuberosity of the maxilla was thoroughly involved. One surgeon having advised against operation, although every one else was in favour of it, made the patient undecided, and a delay of two or three months took place before he ultimately made up his mind to undergo the operation, which was then performed by Sir Joseph Lister, who exposed the part freely by an incision from the angle of the mouth nearly up to the ear. He chiselled away the bone, not resecting the entire maxilla, but rather attacking the disease where he found it. The whole of the tuberosity was removed and a hole made into the antrum. Immediately after the operation, on looking into the patient's mouth there was a very large hole indeed, as large as a very large walnut. That has speedily healed and contracted until it has come down to the smaller part of this plug. I am sorry to say that I am unable to find the model, which I must have somewhere, and unfortunately the patient is abroad. The difficulty about satisfactorily closing

the hole is that it is situated on the edge of the hard and soft palates so that the parts behind it move and so do the parts outside of it. I cannot get anything to do to my satisfaction, but the thing that does best is a piece of velum rubber, thick where it fits into the hole, but very thin where it extends beyond its edges on the surface of the palate; this is carried by a tongue of gold from the back of a vulcanite plate. It resembles in form a Kingsley velum for a cleft palate.

The PRESIDENT: I am sure the Society will be much obliged to members who will discuss Mr. Tomes's communication. The disease appears to have been in the alveolus and not in the antrum. I had a case of cancer in the antrum happen when I was Dental Surgeon to the West London Hospital. It is reported in the Transactions of this Society. In that case the jaw on that side was removed. The patient, a child, died in the hospital. The first symptom was protrusion of the molars, and extraction of those led to diagnosis of the disease.

MR. HENRI WEISS: As Mr. Tomes's case bears so close a resemblance to one in which I have been interested for some time, and which I have already brought before the Society, I would like to ask him whether in his case there are any white patches existing about the mouth and cheek, such as are present in my own case. These white layers peel off and are due to irritation.

MR. C. S. TOMES: There are no white patches; no ichthyosis about the mouth. It is a typically healthy mouth. The epithelioma originated wholly in the alveolus and not the antrum, which was opened into in going sufficiently wide of the disease.

The PRESIDENT then read notes of a case of deformity of the lower jaw—perhaps hyperostosis. Patient shown by the President.

Patient a gentleman, aged forty, has been under my occasional observation for about ten years, having during that period paid visits from time to time for ordinary dental operations. My attention was from the first drawn to the

abnormal development of the lower jaw. It has always presented the peculiarities, although I believe in a minor degree, which are now observable. I at first regarded it as an exaggerated case of under-hung jaw, having ascertained there was no history of injury to account for it. The deformity consists in the great size of the bone, and apparently undue length of the ramus, whereby the lower jaw is protruded and cannot be brought into apposition with the upper. It affects the body of the jaw only, the alveolar border being natural in size, and the enlargement is almost perfectly symmetrical.

The patient states that so long as he can remember he has been under-hung. He has not noticed any increase in size of the jaw. It, however, seems to me decidedly bigger than at first, and the patient, seeing it daily, might not be so good a judge of this as one who saw it only at long intervals.

He states that the jaw is much more tender than it used to be, and gives slight pain when pressed, and sometimes the pain increases.

The molars, except one, in the upper jaw have been gradually lost through wasting of the sockets; the rest of the teeth—some of them filled—remain. At the patient's repeated urgent request, after at first refusing, I have provided him with artificial teeth to fill the gaps; although I fully explained that they would be probably useless in consequence of his inability to bring the jaws together. He, however, had a piece made in the country from which he stated he got some use; and on his losing some more teeth I made the plates which he now wears. I should be glad to have any suggestion as to the construction of an apparatus which might serve effectually in mastication.

Mr. Jonathan Hutchinson, remarking upon the case, said the evidence as to whether the jaw was increasing in size or not seemed to be a little doubtful. The jaw was somewhat tender, which suggested that it was increasing. He was specially interested in the case in connection with the new disease acromegaly, in which all the bones of the head, of the digits, and of the toes increase in size. He had a patient

suffering from acromegaly, whose jaws are very large—much larger than natural; the digits were quite twice their natural size. Then with reference to the case he thought at first the patient's head looked large, but he has no tenderness of the skull bones; if he had, that would point to the possibility of its being acromegaly in its incipient stage, but it may be the beginning of acromegaly. He thought also the jaw was first affected. The question seemed to be whether it was a case of congenital malformation, or, if progressive, it was probably a case of acromegaly, and the patient might experience some increase in the size of the head later on.

Mr. C. S. Tomes: There is just one point which throws a little light on the case, though not much: the patient told me that when a child an attempt was made to correct the deformity by means of an inclined plane. I think if the lower jaw had projected as much as it does now, the most sanguine practitioner would hardly have entertained any hope of remedy by such means. Mr. Christopher Heath had rather a curious case in which the articulation of the jaw was thrown out on one side by the overgrowth of the jaw, and the hypertrophy was confined to the jaw. It was not symmetrical, and by incising the condyle of the jaw, the patient's articulation was restored.

The President then called upon Mr. Jonathan Hutchinson, F.R.S., for his Paper on "A Surgeon's Notes on certain Diseases and Malformations of the Teeth."

A Surgeon's Notes on certain Diseases and Malformations of the Teeth.

By Jonathan Hutchinson, F.R.S., LL.D.,
Consulting Surgeon to the London Hospital.

My first acquaintance with the disease which is, I believe, known in the dental profession as "Riggs' disease," but for which I would propose the name *Sycosis dentium*, began with the observation of patients who had lost all their teeth before arriving at middle life, and in whom the usual history of dental caries, &c., with pain, was absent. The subjects of this condition had of course come under my observation quite accidentally in connection with other surgical maladies. But my interest was unavoidably excited by the fact that it was possible for a man, whilst apparently in good health, to lose all his teeth without obvious cause. At length it happened that a patient came to me in whom the condition was in progress. A good many of his teeth had already fallen, and others were becoming loose; there was no caries and no toothache, nor was there much of the general inflammation of the mouth which attends mercurial salivation. The gums were, however, somewhat

inflamed, but the inflammation was chiefly limited to the inmmediate neighbourhood of the tooth fangs. Around several of these, by a little pressure, pus might be made to exude. The disease was clearly, in the main, a suppurative inflammation of the tooth socket. Its similarity to the disease of the hair follicles which we know under the names of Sycosis and Tinea tarsi at once struck me. At this time I had never heard of Mr. Riggs' observations, nor was it until some time afterwards that I became aware that the condition had been observed by him and had received his name. My information upon this point came through a patient. A fellow-countryman of Mr. Riggs, an American, consulted me for some ailment, I forget now what, and I had occasion to examine his mouth. He observed the interest which I took in the loss of teeth from which he was suffering, and observed that he was the subject of "Riggs' disease." I took his diagnosis and at once made inquiries amongst my dental friends, and collected what information I could respecting it. To you, Mr. President, I was specially indebted for detailed information, and you told me when I mentioned my sycosis comparison that you had yourself compared the disease to baldness. The information which I have collected amounts in the main to this: that all dental observers agree as to the fact that there is a liability in some persons to have

the teeth fall out one after another without any material aching or pain, and with suppuration about the tooth socket. Further, I think it is agreed that no cause has as yet been assigned for this ailment, that it is not connected with syphilis, or with any special form of debility, but may occur to healthy adults, and is, perhaps, especially frequent in men. The disease does not commence by an attack of general stomatitis, but begins by discharge around the roots of one or two teeth, and then gradually spreads to others. It is very intractable under treatment, as indeed might be expected from our ignorance as to its cause. It is of slow progress, but may in persistent cases, and after many years, leave the patient quite edentulous.

Let us now contrast these facts with those which we know concerning ophthalmia tarsi. I take ophthalmia tarsi in preference to sycosis of the beard, or whisker, because there are different forms of the latter which pass under the same name. Some of these are cryptogamic. Permit me, however, to express a definite opinion that the common forms of sycosis of the beard, &c., are exactly the same as ophthalmia tarsi, and that both are inflammatory and not cryptogamic in their origin. Ophthalmia tarsi is a suppurative inflammation of the follicles of the eyelashes, which produces a contagious secretion, capable

of infecting other follicles, and thus causing the disease to spread. It occurs in young and rather delicate persons by preference, but may be sometimes seen in adults. Its connection with debility, or rather with want of tone, is, I think, very definite, but at the same time it must be admitted that it is often seen in those who are not debilitated in any special degree, and who consider themselves in excellent health. Sometimes the disease spreads to the eyebrows. If the patient be an adult male it frequently affects the whiskers, moustache, and beard; in rare instances it may attack the scalp, and yet more rarely it may affect the pubes and axillæ. I have known a patient rendered almost entirely bald by a pustular inflammation of the scalp affecting the hair follicles, and in almost all respects similar to ophthalmia tarsi, the latter malady being also present at the same time.

There is yet another malady which I think we must associate with the inflammatory and non-parasitic form of sycosis; it is one to which I ventured many years ago to give the name of sycosis of the nails (*sycosis unguium*). In this disease, which is rare, all the nails of both hands and feet are liable to suffer from suppurative inflammation at their roots. The nail becomes loosened, and may fall. The disease, so far as I have seen it, occurs only in cachectic and under-

fed children. It is clearly contagious, beginning on one digit and then spreading to others.

The methods of treatment which succeed in the cure of inflammatory sycosis, whether of the eyelids, scalp, face, or nails, is strongly in confirmation of the theory of contagion, and at the same time of the belief that there exists a constitutional debility, which is to some extent a predisposing cause. That the share taken by the constitutional predisposition is small, is proved by the fact that when once cured, as it may easily be by proper treatment, the disease does not as a rule show any tendency to return. I have seen this over and over again in very bad forms of ophthalmia tarsi (*sycosis tarsi*), and in some in which the whiskers and beard were affected. In the latter, however, the process of cure is so very different that we have much fewer opportunities of testing its permanency. The method of cure consists in acting vigorously up to the theory of its being a contagious inflammation. One or other of the remedies which repress cell growth when overactive must be employed; and of these by far the best is mercury. Great care must be taken to allow this agent to come in contact with the cell structures which are involved. To this end all crusts must be removed, and the eyelashes pulled out. If necessary, the epilation must be carefully repeated, and in its intervals a weak mercurial

ointment must be used. At the same time tonics must be employed. Under these measures it is very seldom that a complete cure cannot be obtained. If it is not, it is certainly due to the fact that the patient is out of health, and cannot adopt the measures for recuperation.

I shall have to point out directly how these facts may be applied to the treatment of sycosis of the teeth. Before doing so I may, however, mention a very remarkable instance which impressed me with the necessity for constitutional treatment. A gentleman of middle age, who simultaneously with one of his children suffered severely from sycosis tarsi, had for a considerable time resisted the influence of local treatment. He objected to epilation, but he had used the ointments perseveringly, and he did not get much better. He was not definitely out of health, but he was living in a town, and somewhat run down by work. I advised him to try the addition of champagne in addition to his tonics, knowing that this wine has in many cases a really marvellous influence over cell nutrition. He did so, continuing meanwhile the use of the ointment, and in a few weeks his eyelids were perfectly well. It is now six or eight years since the cure and he has never had any relapse. As regards the permanently toothless condition which results in the worst cases of Riggs' disease, we find its

parallel in certain forms of lippitudo, with entire destruction of the eyelashes as a consequence of sycosis tarsi. The fact, however, that hairs may grow again after exfoliation from disease, or after mechanical removal for purposes of treatment, and that this may occur over and over again, will explain the fact that their permanent and entire loss is a less frequent result of the disease than in the case of the teeth. It will also explain the far higher degree of intractibility of treatment under treatment of Riggs' disease, for we cannot pull out the teeth in order to gain access to the disease underneath, as we do so freely in cases of sycosis of the hairs and nails. Although the comparison between hairs, nails, and teeth as to their development is in many respects very close, it differs in this, that there are no structures capable of reproducing teeth.

The next subject on which I propose to say a few words is one on which I must speak with great caution before the members of the Odontological Society. It is as to the occasional injurious influence upon the tongue and mouth generally of materials used for stopping the teeth. I have long entertained an opinion that some of the amalgams do occasionally cause sores on the tongue and mucous membrane of the lips, and I have expressed that opinion some years ago in public. I have little more to do on the present occasion than to

state that the experience of recent years has strengthened those impressions. I still very frequently see cases in which irritable sores on the tongue occur under conditions which oblige me to believe that the stopping used for the teeth is their cause. This never occurs in connection with stopping with gold or with gutta percha, but the material is always some black compound. So strongly have I been impressed with this fact that I always warn patients who are liable to sore tongue not to allow any black amalgam to be put into their teeth, and very frequently in intractible cases of sore mouth advise them to have all teeth which are so stopped to be either refilled with some other material or extracted. My statements on this point must be regarded simply as those of an observer. I am not prepared to enter into any detailed discussion on the chemical points involved, nor am I indeed acquainted in detail with the differences in the composition of the materials employed by the dental profession. Some of these are, I believe, secret preparations so far as the exact proportions used by manufacturers are concerned; and it may be that there are important differences amongst them as regards the possibility of their undergoing some sort of solution in the mouth. My dental friends assure me that these amalgams are practically indestructible, and that nothing is more uncommon than for these plugs to

exhibit any evidence of erosion or solution. Some of them admit, however, that inferior amalgams may possibly be dissolved. In particular I am told that there is a copper amalgam which stains the adjacent surface of the tooth, and which, therefore, to some extent presumably undergoes solution. However this may be, the fact remains that it is in my experience very usual to find a black stopped tooth opposite to an intractible sore on the tongue or lip, and to see the sore get well after the removal of the stopping or the tooth. Nor have the cases which have come under my observation been in patients who have been treated by incompetent practitioners, or with cheap materials.

One of the first cases which drew my attention to this subject still remains one of the most definite and instructive. It was that of a physician from the United States, who had a number of very intractable ulcers inside his lips and on the sides of his tongue. Everybody whom he consulted assured him they were syphilitic, but said he, "I am quite certain that I have never had syphilis." He was married and had healthy children, and he did not smoke. His teeth had suffered much from caries, and a great number of them were stopped with amalgam. The stopping had been done in America, and apparently well done. After much unsuccessful treatment by other means, I advised

him to get rid of all the stopping. He did so, and his mouth got well.

I do not intend to trouble the Society with any detailed remarks on the subject of *Syphilitic Teeth.* I have in fact nothing that is really new to say about it. It may, however, be not without its use to just briefly refer to the present state of opinion respecting them. I believe it may now be said that in all parts of the world the value of notched upper incisors is fully recognized as an indication of the previous occurrence of an attack of inherited syphilis in infancy.

I think it may be added that as time has gone on we have learned to concentrate our attention on these upper central incisors of the permanent set as being indeed "the test teeth." For myself I may say that year by year I find that I pay less and less attention to the peculiarities presented by the other teeth. Those peculiarities are often much more conspicuous than are the notches that are in the test teeth, but they are far less trustworthy. They are in fact misleading, and in a majority of cases are caused rather by the remedy which was given for the syphilis than by the syphilis itself. Respecting the test teeth, an experience of now upwards of thirty years enables me to speak with the greatest confidence. I do not recollect a single instance in which their malformation, if well characterized, has misled me.

When they are present, their evidence may, I believe, be trusted to the full. It may be well, however, here to say a few words respecting the numerous cases in which, in spite of the existence of inherited taint, the characteristic teeth are not present. I use the word characteristic advisedly, and in its strongest sense; for I suspect that there are not a great many cases in which these teeth present no peculiarity whatever. There are many in which their malformations are only slight, and such as cannot in any way be trusted as symptoms. The best opportunities which we get for observing the range within which syphilitic malformations of the teeth may vary, occur in cases in which several members of the same family have suffered from inherited taint. In such cases I have not infrequently known one or two of the children to present the characteristic teeth, whilst another in whom it was certain that the taint still existed showed little or no peculiarity. I may here note that the experience of recent years has confirmed, without however in any way explaining it, two little items of clinical observation which I made long ago. The first of these is that those subjects of inherited taint who present us with good examples of interstitial keratitis have almost invariably malformed teeth, and those who have malformed teeth scarcely ever escape interstitial keratitis. The other point is that those who are

liable to suffer in after life from phagadænic affections of the mouth or throat very often—indeed, perhaps, usually—show nothing peculiar in their teeth. Several remarkable illustrations of this latter statement have been quite recently under my observation.

If I turn now to the subject of stomatitic, or mercurial teeth, I am quite aware that I am entering upon a subject concerning which the propositions I ventured to make some years ago have not by any means met with general acceptance. Those propositions were to the effect that, in cases in which great and general damage to the enamel of the permanent set of teeth is observed, it ought to lead us to suspect that the patient has in early infancy passed through an attack of stomatitis, attended with inflammation of the tooth sacs. Subsequent experience has confirmed me in this opinion, and I feel more and more confident, as facts have increased in number, that by far the most important cause of defects in enamel development in the permanent set of teeth is the use during infancy of mercury in one or other form. I by no means assert, and never did assert, that mercury is the only cause of the stomatitis which produces what I ventured to call stomatitic teeth, but that it is by far the principal one. A knowledge of this fact has led me of late years to be far more careful than formerly as to

the use of mercury in infancy. The test teeth for mercury are the first molars of the second set. Their condition should be contrasted with that of the two premolars. If all the eight latter have good white enamel while all the four former show absence of enamel and spinous discoloured surfaces, then I believe we may with confidence assume that the child took mercury in infancy, or that some cause for a similar kind of stomatitis then existed. Of the concurrence of these teeth with lamellar cataract, a fact to which attention was drawn many years ago, I have had during the last few years some very remarkable cases in proof. Whilst admitting that it is to some extent still an open question whether there is any correlation of development between the eyes and teeth, I still hold to the belief that the connection between the two phenomena referred to is not to be so explained, but that the lamellar cataracts are due to convulsions in infancy, and the damage to the enamel of the teeth is due to stomatitis caused by mercury given for the convulsions.

Of late years I have been in the habit of using what I have called "mercurial teeth" as an assistance in reference to treatment in adult life. If a patient presents himself, we will say for syphilis, whose teeth show the mercurial malformations, I observe the greatest possible care in the administration of the drug in question. My attention was

first drawn to this point by the occurrence of very profuse ptyalism from very small doses of mercury, in a patient in whom I noticed afterwards that his teeth were most definitely of the mercurial stamp. It occurred to me at once as possible that he had an idiosyncrasy involving unusual susceptibility to the drug, and that it was owing to this idiosyncrasy that his teeth had suffered from what was given in infancy. If this view be correct, mercurial teeth may rank as revealing symptoms, and may be of value as giving us information as to individual susceptibilities which we could not have otherwise recognized.

The son of my friend Dr. R. offers a very good instance of mercurial teeth in association with lamellar cataract, and as his father is a medical man we have exceptionally good opportunity of obtaining the facts as to his infancy. The condition of lamellar cataract in both eyes is very marked, the opacity being very dense and the obstruction to vision such as to make operation desirable. It has been decided to use the needle. He is a clever sharp lad, and does not suffer much from headache or other inconveniences. The history is that in infancy he had laryngismus stridulus, and also a long succession of severe convulsions, and that for both of these affections he took much mercury. The result has been that his four first molars all show their crowns denuded of enamel and black

from discoloration; whilst his eight bicuspids are all perfectly formed and well covered with white enamel. His incisors and canines all show the enamel more or less defective, and their surfaces discoloured. At first sight I thought that there was an exception to the rule, and that one of the bicuspids was carious, but on more careful inspection I found that the carious tooth was really a temporary molar, and that a well-capped bicuspid was just coming up by its side.

The whole subject of the *correlation of the defects of the teeth with those of other organs* and parts is one worthy of careful study, and it is one with regard to which as yet but little has been done. My friend Mr. Moon has published in the Transactions of this Society two series of cases in which rat-like teeth—that is, teeth pointed by suppression of the lateral denticles—were present in several members of the same family, and in association with other defects. These defects were microphthalmos and deficient formation of hair. Mr. Moon's observations concerned the second set of teeth.

I have myself published in the Medico-Chirurgical Transactions, some years ago, a very remarkable case in which a male child was born almost hairless, and with great defect in the development of his skin. In particular his mammary glands were absent. There was no obvious

defect in his eyes, and his teeth, which were his first set, were only peculiar in being small and not placed straight. He had no microphthalmos. We may take his case in proof that extreme defects in the formation of the skin and its appendages are not necessarily attended by defects in the development of the teeth. This fact has been further illustrated by one observed by my son, Procter S. Hutchinson, in which a puppy born almost hairless showed no defect in its milk teeth. It would be of much interest in connection with this subject, if surgeons engaged in ophthalmic practice, and others who may have opportunities, would in all cases of microphthalmos make careful note as to the state of the teeth. We want particulars in these cases both of the first and the second sets. Conversely, if those engaged in dental practice would in all cases of "rat-teeth," or other remarkable defects of development, keep note of the state of the eyes, hair, and nails, we should get a class of facts which might help us to avoid error, and possibly give an insight into new laws as to correlation.

I have to repeat, what I have said formerly as to the dentition of those that are ricketty, I do not believe that the subjects of rickets, as a rule, show any definite peculiarities in the development of their permanent teeth. I have carefully availed myself of all opportunities for observation,

and feel sure that the term "ricketty teeth" is used, when it is used, without any definite meaning.

It is perhaps time that something more should be attempted with a view to arrive at knowledge as to the significance of the tooth structure as an index of that of the other tissues of the body. If the teeth wear well or badly, are we justified in either case in assuming anything as to the longevity and capacity for wear of other tissues? In any investigations on these points we must carefully discriminate as to the different forms of tooth disease. It is not sufficient to state the mere loss of teeth, we must know from what cause they were lost. The facts as to Riggs' disease, if I have got a correct impression respecting them, show that the teeth may be lost without there being any inherent defect in their structure. In this affection the teeth, as yet sound, fall out from inflammation of their sockets. Such cases are wholly different from those in which the teeth suffer from premature caries, or, as the patients call it, "crumble away." In this latter group of cases it is very improbable that the teeth are the only tissues in the body which have been badly developed, and, did we fully understand the bearing of the condition, it might help us materially to a recognition of the patient's state of health and life prospects.

Not only ought we, I may suggest, to try to learn all we can as to the vital significance of early decay

of teeth, but we may perhaps make some use of their tendency or otherwise to accumulate tartar. This tendency unquestionably runs in families. I have observed it in a very marked degree in members of three generations, and have seen it under conditions which would imply that it had very little to do with neglect of attention to the toothbrush. Some persons indeed, who are able to prevent the collection of tartar on the outer surfaces, are quite unable to do so as regards the inner surfaces of the incisors. I have little doubt that excessive tendency to tartar is in many instances a proof of habitually excessive flow of saliva, and I believe further that it often occurs in those who have a tendency to gout.

It is not often that I trespass on the domain of the dental profession in respect to the scaling of teeth. I was, however, consulted the other day by a lady who believed she had a bone growing in her mouth, and for whom I had to remove, not without some force, the fragment which I now exhibit. I may own that at first glance I was puzzled as to what it was, for it was quite smooth and polished, and looked in the mouth twice the size that it does out. She was a maiden lady of most particular habits, and it will be seen that the accretion is grooved by the use of the toothbrush. There was gout in the family.

As regards *observations on the milk teeth*, I

suppose it may be taken for granted that they will usually display the results of disturbances of the health of the fœtus during intra-uterine life rather than of anything which has occurred after birth. Thus they usually escape malformation in inherited syphilis, though very liable to suffer from caries, and to fall out early. It would be of much interest if those engaged in family practice would, in all cases in which pregnant women suffer from severe illness, and more particularly when they have to take a course of mercury, note the state of the infant's first dentition.

I will now, with your permission, pass to another subject, and one which I do not feel quite sure that I am in good taste to mention at all in the present meeting.

I have recently seen two cases in which at the age of fifty the whole set of thirty-two teeth were in perfect condition. This is no doubt very exceptional, and it may be worth a few lines to record the conditions as regards inheritance, &c., which attended it.

In one case my patient was a single man born in Cornwall, but bred up from childhood in a wild district of the United States, where he suffered from "dumb ague." For this he took calomel and quinine, and of recent years he has taken much mercury for syphilis. In spite of this, however,

he has never in his life had toothache, he has not a single spot of caries, and his teeth are all beautifully white and in perfect order. He is a man of very precise habits, and has for long been accustomed to clean the teeth three times a day, using a rather soft brush and some powdered chalk which he scrapes for himself. Once or twice a year he carefully scales the lower incisors behind free of tartar. He is a spare man, of sound health and temperate habits. His parents lived to be old, but his mother had been thought to be consumptive. He believes that his father had excellent teeth, but his mother not so; one or two of his brothers and sisters have very good teeth, but one brother has suffered much from toothache. There is no history of gout in the family, and no peculiarities as to diet are to be noted.

In my second case the gentleman was decidedly gouty, and I quoted to him the proverb, "You have got a fine set of teeth, mind you don't dig your grave with them." He was fifty-four years of age, and his set of teeth was absolutely perfect; none had been lost, and none showed any tendency to decay. With the exception that he had suffered several times from gout, and from gouty dyspepsia, he had enjoyed good health. I did not get any facts as to hereditary history. His teeth were clean and white, and had evidently been taken good care of.

The only explanation of the proverb I have mentioned that I know of is that those who have good teeth are prone to be large eaters, and may in this way be likely to develop indigestion, gout, and other maladies due to the over-supply of food. Some of my medical friends are, I know, in the habit of speaking of "gouty teeth." With the exception that I think we not very infrequently find, in association with the general vigour of constitution and soundness of tissues which members of gouty families often exhibit, a more than usually good preservation of the teeth, I do not know of any peculiarities which denote gout. Those who preserve their teeth well often show, simply as a consequence of their long use, a remarkable degree of wearing down. In some instances this wearing down may be due to the habit of grinding the teeth, and Dr. Graves has taught us that a remarkable tendency to teeth-grinding is usually indicative of gout. He records some remarkable instances in which gouty patients suffered extremely from tooth-grinding, the teeth being worn level with the gums, and the habit becoming so incessant that the patients were obliged to avoid all society. I am not aware that any of the more recent writers on gout have recorded any similar cases. No example of persistent tendency to tooth-grinding in a gouty patient has ever fallen under my notice.

The liability to the wearing of teeth by friction,

whether in mastication or otherwise, evidently differs very much in different persons. In the first of the two cases which I have just described, the man was in the habit of brushing his teeth three times a day, yet not the slightest evidence of wearing from the brush was present. I have seen mouths in which a furrow produced by the toothbrush crossed the necks of the incisor teeth so deeply as almost to cut them in two. The worst that I ever saw of this kind was in the person of a dentist, who assured me that such toothbrush furrows were not by any means uncommon. The pipe notch caused by smoking, although not unfrequently seen, is yet sufficiently rare to make it evident that its production depends to a large extent on some individual peculiarity in the construction of the teeth.

Discussion.

The President: It would be wrong to pass over Mr. Hutchinson's Paper without specially thanking him on behalf of the Society for coming here to read it; for the valuable contribution to our Transactions, and to scientific literature. Much as we know he dislikes compliments, it would be wrong not to express the feelings which we in common with the profession entertain with regard to his work. Mr. Hutchinson is one of the men who now uphold the high standard of surgery. He observes and records with great care; nearly every observation he has made has been accurate, and will tend to the advance of our knowledge. The only point in his paper in which I should be disposed to disagree with him, is on erosion, that the "toothbrush-groves" are not necessarily caused by the toothbrush. The question of amalgam stoppings Mr. Hutchinson mentioned to me many years ago. I then told him I had never seen cases of the kind which he has described, nor could I form any theory which would account for them. With reference to Riggs' disease, Mr. Hutchinson has thrown some light upon a matter upon which our knowledge has been very imperfect. With regard to syphilitic teeth, I have seen a vast number of children with syphilitic history, who had nothing wrong with their teeth.

Mr. Charters White: I have listened, Sir, with a great deal of pleasure and interest to Mr. Hutchinson's Paper, and I am sure that it has been a very suggestive one, and when we have the opportunity of reading it we shall all profit by it. There is one thing with regard to Riggs' disease which I have noticed: it has always struck me that the disease has been accompanied by the falling off of the hair. I have always asked patients and have found it almost always so.

Mr. C. S. Tomes: Mr. Hutchinson has given us such an amount of material from his wealth of observation that it seems to me difficult to know what particular part to take up; there is such an infinity of points that it is difficult to make a selection. But there is one thing to which I should like to draw Mr. Hutchinson's attention, viz., an argument against the contagiousness of what we call Riggs' disease. It is very common to find that it attacks the mouth symmetrically. That, so far as it goes, would seem to point to some connection of the disease with what one vaguely calls constitutional causes. On the other hand, where you have one or two badly affected teeth, the best thing you can do is to take out the very bad ones and treat the others. And then again, the measure of success which attended Dr. Riggs' treatment would point rather to there being some contagion. Dr. Riggs' treatment—which I think is very rarely carried out as he would carry it out—consisted in a very severe scraping, which put his patients to a great deal of suffering. He would point out how very bad the cases were, and certainly very great advantage resulted from this thorough scraping away at the margins of the alveolus, but there I think it ended. I have never known a case of Riggs' disease in my own experience successfully treated. I have known cases which have been supposed to have been successfully treated, but they always recurred; but that perhaps is not wonderful, because without the extraction of the teeth and the treatment of the socket the treatment could hardly be thorough.

Mr. F. Newland-Pedley: I think, Sir, it would be very serious if Mr. Hutchinson's remarks on the subject of amalgams were to go forth to the profession without being called in question. I do not think that any general condemnation of amalgams would be warranted, nor do I hold, speaking generally, that the effects referred to are due to the quality of amalgams; a great many old amalgam stoppings become sharp at the edges, and these are the cases where we have ulceration of the tongue. I should be inclined to agree with Mr. Hutchinson that Sullivan's amalgam would be more

likely to produce ulceration than any other, because it is very soft, and after a time has a very knife-like edge. When amalgam fillings are properly finished off and polished, they are not likely to cause soreness of the tongue or gums.

Mr. Storer Bennett: I think, Sir, that Mr. Pedley's remarks are extremely valuable. I cordially agree with him that it should not go abroad in the Transactions of the Society that amalgam fillings *per se* are liable to produce ulceration. I do not wish for one moment to impugn Mr. Hutchinson's observations, but I am sure that he will admit that we as dentists see many more amalgam fillings that have been in a number of years than could possibly fall to his lot, and I think it is the experience of dentists that amalgam fillings may remain many years without injurious results to the tongue or mouth. With reference to the subject of Riggs' disease, Mr. Hutchinson's observations with regard to the hair point to the fact that the patients are not suffering from constitutional debility, but I think it is the experience of dentists that those who are suffering from Riggs' disease are generally run down, and there is constitutional depression in most of them. It may be interesting to members of the Society, or to Mr. Hutchinson, to know that a great many animal solosely confined, or imprisoned, suffer from Riggs' disease: in many cases, where the history has been known, debility has been present. I think, therefore, in this disease the constitutional condition is generally a lowered one.

Mr. Moore (Croydon): I had, Sir, a case which came under my notice a few years ago. It was that of a lady thirty years of age, very regular in her habits, perfectly healthy in every respect, no loss of hair, good colour, good physique, but she had Riggs' disease in both upper and lower jaws, so much so that at thirty years of age the teeth were all loose and coated with nodules of tartar; there was no offensive smell. I removed the whole of the upper and under teeth, and now the gums are perfectly well.

Dr. G. Cunningham: I should like, Sir, to bring forward a photograph which has some bearing upon the remarks made

by Mr. Hutchinson at the close of his paper. It shows the necessity—not only in amalgam stopping—of a joint inspection by the medical man and the dentist. Mr. Hutchinson referred to the teeth being worn down by the use of a pipe, stating that it might be an index as to the character of the tooth substance. I think, as a rule, it shows rather the quality of the pipe than of the teeth. I have observed that the worst cases of wearing of the teeth from pipe-smoking have been produced by the common clay.

Mr. Walter H. Coffin: I only rise, Sir, because I understood a most distinguished member of the Society to commit himself to the incurability of Riggs' disease. I should like to say that I have known a number of cases of young patients—from twenty-five to thirty—cured. It is open to any one to say that as the conditions were cured it was not Riggs' disease, but all the characteristic appearances of the disease had been present. In cases of more advanced age I have seen every symptom pass away, but recur. I have had occasion to collect much that has been written on the subject, and I may assure Mr. Hutchinson that no constitutional treatment has been known to arrest the disease, and there is no evidence of a constitutional cause. In reference to Mr. Storer Bennett's remarks about depressed vitality existing in cases of Riggs' disease, the admitted innutrition of the parts affected has an interesting bearing upon constitutional causes. It is perhaps going beyond the mere question of pathology to speak of the treatment of Riggs' disease, but as I have spoken of what I consider to be cases of cure in young subjects, it would be unfair not to say that the treatment was entirely local, not merely mechanical (such as Dr. Riggs' treatment), nor entirely antiseptic, because combined with stimulating caustics.

Mr. Jonathan Hutchinson, replying, said: I desire to thank the members generally for the very kind criticisms of my crude statements. With reference to Riggs' disease, I should have very much liked to have more information on the point of constitutional proclivity, but there seems to be some

difference of opinion. I understood one speaker to say that in all cases the patients were feeble, but I repeat what I have said, that I have very often found it in otherwise healthy persons. I was under the impression that it was *generally* seen in persons in good health and middle age. I have seen patients who have lost all their teeth and are presumably perfectly well. One speaker remarked about animals. He seemed to think it occurred only in unhealthy animals, but I have seen the case of a sheep-dog which has lost all its teeth; this was an animal not in confinement, and in good health. In these circumstances we could only explain it on the theory of contagion. Mr. Tomes certainly hit a point when he referred to the symmetrical character of the attacks: there are symmetrical forms of skin disease in which exactly the opposite part is attacked—that is a peculiar proclivity. Contagion never produces sore mouth, it only produces alveolar suppuration. I should be very sorry, Sir, if I were to be understood to attack the use of amalgams generally. I did not intend anything of the sort. I am quite aware that a large number of amalgams are used to the great advantage of patients. All I wished to draw attention to was that there are cases where from the peculiar condition of the saliva and the colour of the teeth it must be inferred that the effect is the result of the chemical action. I am well accustomed to examine teeth for mechanical defects, and sometimes I have been unable to detect any. So strong is my belief that sore mouth is often produced by the teeth, that I always look at the teeth where there is no history of syphilis. I am frequently sending my patients to have their amalgam stoppings taken out.

The usual votes of thanks having been passed, the PRESIDENT announced that the next meeting would be held May 6th, when papers would be read on "Electrical Progress and Dental Practice," by Mr. Kirby, of Bedford, and on "Vacuum Chambers, Air Chambers, and Artificial Rugæ," by Mr. David Hepburn.

The meeting was then adjourned

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

May 6th, 1889.

MR. FELIX WEISS, L.D.S.,

VICE-PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

MESSRS. HENRY GEORGE READ, 30, Finsbury Square, E.C., L.D.S., M.R.C.S., L.R.C.P., L.S.A., and THOMAS GEORGE READ, 31, Cavendish Square, W., L.D.S., D.M.D.Harvard, were balloted for and elected Resident Members.

The CHAIRMAN called upon the Librarian for his Report.

The LIBRARIAN (MR. ASHLEY GIBBINGS): I have only to report, Sir, the receipt of the quarterly Journals, including the "Journal of Anatomy and Physiology" and the "Journal of Microscopic Science," also several periodicals from Mr. Harding.

The CURATOR (MR. STORER BENNETT) reported: I have received two molar teeth, a lower molar and a lower molar root very largely exostosed. They were removed with great difficulty, and are presented to the Society by Mr. John Worsley.

MR. CHARTERS WHITE said: Sir Richard Owen at the meeting of the International Medical Congress eight years ago reminded his hearers that "Knowledge is power," but pertinently asked, "but what of half knowledge?" I am

afraid that a full knowledge of any subject even in these progressive times is scarcely to be expected, far less realised, for the deeper our acquaintance with any branch of study, the more cognizant are we of greater depths lying beyond, and we are therefore fain to rest content with much that may be characterised as "half knowledge." This, in my opinion, is our position now in relation to Antiseptic Dental Surgery. Antisepticism in its various phases has furnished us with many encouraging examples; thus ovariotomy and other branches of abdominal surgery, before the introduction of the antiseptic treatment, were truly regarded with dread and misgiving, but are now of daily occurrence and attended by almost constant success; so again, in surgery of the thoracic region, the use of antiseptics has given a boldness to the operator while holding out a cheerful prospect of successful recovery to the patient. This is denied to us and our patients; we cannot, in our laudable desire and endeavour to carry out the canons of conservative dental surgery, stand up before our patients and conscientiously assert the perfect success of our attempt to save a tooth which will be free from pain ever afterwards. It therefore behoves us to carry our investigations in the regions of antiseptic dental surgery to their fullest extent, and leave no antiseptic agent untried till we find one whose action leads on to unvarying success. Until we do so we cannot say that we have passed the boundaries of "half knowledge," and consequently of half the power a full knowledge would endow us with. In the after treatment of devitalised pulps the antiseptic is the main factor of our success, and it is in the application of an agent whose action is thorough and complete that we may look for the best results. Forty years ago, creosote in combination with arsenic and morphia was employed in the destruction of the exposed nerve, but in my experience it did not prove successful, and was attended with much pain; afterwards the creosote was superseded by carbolic acid, from the local anæsthetic effects of which much less pain was inflicted and the morphia was found unnecessary, a mixture of arsenious acid with the carbolic acid being all

that was needed to complete the almost painless destruction of an exposed pulp; this, after repeated dressings with sanitas or eucalyptus oils, which depend for their efficacy upon their contained peroxide of hydrogen, ended in a fair percentage of success, but since then an antiseptic agent has been employed by me during the last nine months, without in any case disappointing my expectations, that I felt it might be my duty to my brethren and our patients to call attention to it. We all know full well that oxygen is a most powerful destructor of all effete matter, that dead and decomposing atoms are speedily burnt up by its *erema causis;* hence peroxide of hydrogen, being 60 times more powerful than carbolic acid, 20 times more so than salicylic acid, and 40 per cent. more potent than mercuric chloride, has long occupied a foremost place amongst dental astiseptics. Perchloride of mercury is another powerful antiseptic, being fatal to pathogenic organisms even when used in most diluted proportions. The new antiseptic I wish to introduce to your notice is a combination of these two, 5 per cent. mercuric chloride in combination with 5 volumes of peroxide of hyrodgen, and known as Kingzett's Bactericide. By the kindness of Mr. Charles Kingzett I am enabled to place a few samples on the table for distribution to those who would care to try it. In its present strength it is too strong and powerful for surgery use, but may with advantage be reduced by adding $4\frac{1}{2}$ ounces of water to every $\frac{1}{2}$ ounce of bactericide. According to the researches of Koch, a solution of mercuric bichloride of a strength of 1 to 5000 destroys the vitality of all spores in a few minutes, therefore it may safely be diluted to the proportions given by Mr. Kingzett, namely: "To prepare a solution containing 1 part of $HgCl_2$ in 1000, add 1 drachm of bactericide to 6 ounces of water—in other words, 1 part of bactericide in 50 parts of water should be employed." I do not recommend the mixing of a large quantity at a time, as peroxide of hydrogen loses its potency by keeping, and should at all times be kept well corked and in a dark place. Another precaution must be observed in the use of the bactericide: no metal instruments that you care for should be allowed to come into contact with

it as it corrodes them to a serious extent, therefore in mopping out a cavity with a pledget of cotton-wool saturated with it, I keep one instrument for that purpose, but for syringing the solution into pulp cavities, or the fistulæ of alveolar abscesses I use glass tubes drawn in a flame to a capillary point and bent at different angles, the large end being capped with an elastic teat such as are attached to the tubes for filling stylographic pens; with any number of these having various curves any part of the mouth can be reached conveniently.

I am convinced that there is no surer road to a successful result in the dental use of antiseptics, and by which we may pass from that state of knowledge in which we may consider this subject to be at present, and by which we can extend its boundaries to the fully known, than by watching the effects produced by the various agents introduced to our notice, such for instance as the one I now recommend, and modifying their proportions in such a manner as experience may suggest till the same unfailing, unvarying success attends our efforts on behalf of those suffering ones who seek our aid, as that which characterises the antiseptic treatment of our brethren in pure surgery.

The Chairman: The subject which Mr. Charters White has brought before us is one of deep interest. As everybody knows, corrosive sublimate of the strength 1 in 5000 is sufficient for most purposes. It is recommended by the Metropolitan Board of Works. The only fault of the bactericide that I might refer to is that peroxide of hydrogen is so easily decomposed.

Mr. Walter H. Coffin: I should like to say, Sir, that I think very highly of the combination which Mr. Charters White has remarked upon, but I may add that if it requires, in the opinion of those who use it, to be so largely diluted with water, I would recommend that it should not be diluted with plain water but with solution of peroxide of hydrogen, otherwise the peroxide becomes almost a negligible quantity. I think, Sir, a 5 per cent. solution keeps very well, but the stronger solutions are very liable to degenerate to a 5 per cent. solution.

Dr. G. Cunningham (Cambridge): I should like to corroborate the remarks of the last speaker, because I have been in the habit of using a similar preparation, viz.: a combination of peroxide of hydrogen, using a ten vol. instead of a five vol. solution as mentioned, and mercuric chloride of different strengths. I also use mercuric chloride 1 per cent. solution, and should have no hesitation in using it to syringe out a pulpless tooth under the rubber-dam. Of course we know that we can use a 1–1000 solution freely in the mouth without the protection of the rubber-dam. We are able to use stronger solutions even without the protection of the rubber-dam, providing great care is taken. As an apparatus for the purpose I think the small syringe suggested by Dr. Elliott is the best, being superior, in my opinion, to the glass tube and rubber arrangement, because the platina tube attached to the hard rubber stock carrying the small soft rubber bulb, is sufficiently fine to nearly coincide with the diameter of the canal. They may be used for a long time without being deteriorated by the action of chloride of mercury.

Mr. Storer Bennett remarked that Mr. Robbins the chemist manufactured a preparation of peroxide of hydrogen which he (Mr. Bennett) had found to be more stable than the solutions in common use. Mr. Bennett had found the common hypodermic syringes, sold for 3*s.* at the Depôts. were the most efficacious for injecting canals. These syringes are preferable to the glass ones of which Mr. Charters White spoke, as they are not liable to break.

Mr. C. J. Boyd Wallis narrated a case which, having been seen by Mr. Charters White, that gentleman added supplementary facts.

The patient, having been much troubled by a tooth, consulted a provincial dentist, who at first filled it with gold. As this failed to give relief, the filling was drilled into and the cavity was filled with amalgam. Although the nerve was destroyed no permanent relief from pain was achieved, so the tooth was extracted. A Donaldson's barb was then

found embedded in it; this was removed, the canal filled with gold, and the tooth replaced. Subsequently pain recurred and the patient came to Mr. Charters White, who removed the tooth and found the root much eaten away by the pus which existed around it.

The CHAIRMAN then called upon Mr. David Hepburn to read his paper.

A Few Remarks on Suction Plates, Air Chambers, and Artificial Rugæ.

By David Hepburn, L.D.S.

Gentlemen,—When invited by our President to open a discussion on some subject connected more particularly with Dental Mechanics, I elected to address to you a few general remarks on the subject of suction plates, air chambers, and artificial rugæ. It is not my intention to attack in any exhaustive manner the vast range of matter which may be comprised under this heading, but rather to throw out a few ideas which may form a basis for your discussion, and be a means of bringing to light the opinions of members of this Society on subjects of daily interest to all engaged in the practice of dentistry.

With regard to the natural means by which so-called suction plates are held in the mouth, theorists may differ. I think, therefore, it may be interesting to dwell for a few moments on those forces which participate in the retention of such plates.

In the first glance at the subject, the mind

naturally reverts to that simple contrivance called "a sucker," by means of which stones and other weights may be raised from the ground, and one is apt to think that the simple phenomena attendant upon the action of this appliance sufficiently explain the means by which artificial dentures, when unaided by clasps, valves, or springs, are held *in situ*, but such is not the case. A more searching inquiry reveals the fact that here we have but a partial illustration of what actually is taking place.

Let us take the force of "adhesion," and see to what extent it participates.

Adhesion denotes the attraction exerted between particles of two different bodies when placed in contact with one another, in contradistinction to "cohesion," which denotes the attraction which the various molecules of the same substance have for one another.

I need not refer to the various kinds of adhesion, but quote for our purpose *two*, namely: the adhesion of solids to solids, and fluids to solids.

Now if we take two pieces of smooth glass and press them together we find that they adhere firmly. This is not entirely due to atmospheric pressure, for if the pieces of glass be suspended in the vacuum of an air-pump, it will be found that the union is not disestablished, showing that some

other force has been at work in holding them together. This force is the force of "adhesion."

The adhesion of solids to liquids may be exemplified in like manner by lowering a finely balanced piece of glass on to the surface of a liquid. When it is raised again, globules of the liquid will be found clinging to its under-surface, and according to the nature of the liquid so will the adhesive force be evidenced to a greater or less degree.

Now although this is an independent force it must be borne in mind that exclusion of air is necessary for its operation, a fact of practical importance in its application to artificial dentures.

Thus, then, we have the force of adhesion as an important factor in the retention of plates, the adhesion between the artificial base and the mucous membrane being largely aided by the saliva, the vicosity of which renders it a suitable and helpful medium. It is also interesting to note the influence of another force, namely, "capillary attraction," which may be defined for our purpose as "the tendency which a fluid has to find its way between closely fitting surfaces." And it it easy to imagine how, when an artificial denture is held steadily in the mouth for a time, either by pressure of the hand or antagonism of the opposing teeth, the saliva influenced by this force would

prove a valuable agent in excluding air and establishing the desired adhesion.

Let us now briefly consider the laws of "atmospheric pressure" in relation to our present subject.

The atmosphere, possessing weight, and capable as it is of exerting a pressure of about 15 lbs. on the square inch, presses upon substances at the earth's surface, but being a fluid, and following the laws of fluids, it exerts its pressure equally in all directions. Consequently its influence is not appreciated. If, however, the normal conditions be altered, the force of this pressure may be made evident, and no better example of this can be given than by quoting the familiar instance of the "Magdeburgh Hemispheres'" experiment. When these two hollow brass cups are adjusted together, and the contained air exhausted, it will be found that tremendous force is necessary to pull them asunder, in consequence of the absence of pressure from within affording full play to the pressure of the atmosphere from without.

Now this is very much the condition we endeavour to establish when we apply a plate with an air-chamber, but we shall presently see how our endeavours to enlist atmospheric pressure as a retaining force are frustrated by the nature of the oral structures, with which we have to deal, when influenced by natural laws.

In order to make my meaning clear, let me refer

to one other quality possessed by the atmosphere, namely, its elasticity. The atmosphere is capable of expansion and compression to a marked degree. The withered apple in the bell of the air-pump resuming its normal proportions by expansion of its contained air, as the air in the bell is exhausted, exemplifies this, while on the other hand compression of air may be illustrated by the conditions occurring in the descent of the diving-bell. Here pressure of water, to a certain extent condensing the atmosphere in the bell, gives rise to those disagreeable symptoms which any one who has made a descent must have experienced, and the elasticity of the atmosphere is further made manifest by the sudden rush of air in the shape of bubbles as the bell nears the surface and the pressure of water is removed. Thus all through there is a tendency towards the establishment of equilibrium, and whenever this condition is interfered with, certain indicative phenomena arise.

Take, for example, the ordinary operation of cupping. The air being exhausted in the cup, the soft tissues immediately rise to fill the space forced on by the unopposed pressure of the air in the body acting by its inherent elasticity, and much the same thing occurs when we apply the plate, with its air-chamber, to the mucous membrane of the mouth. It shortly becomes com-

pletely filled with tissues, and when this happens, as an *air*-chamber it ceases to act.

It therefore becomes an interesting question how far chambers are useful as a means of retaining plates by atmospheric pressure.

When a plate with an air-chamber is applied to the mouth, two phenomena are evidenced. First its apparent adhesion, and secondly the obtrusion of the soft tissues of the palate into the chamber. If the tissues be soft and moveable, the occlusion of the cavity will take place with great rapidity. If they be hard and unyielding, it will take place more slowly and to a less degree; but in any case there is an attempt of nature to do away with the vacuum which is caused by the sudden application of the plate with its air-chamber to the surface of the mucous membrane.

Now that air pressure can act as a retaining force in such cases, it is necessary that a vacuum should exist, and considering the fact that under the most favourable circumstances only a partial vacuum can be created, I am inclined to think that air-chambers, as such, are of comparatively little service.

How far their action can be increased by the use of suction valves, such as those invented by Brownlie and Leman, is a matter well worthy the consideration of members of this Society, and I trust gentlemen who have tested the efficiency of

these valves in practice will give us the benefits of their experience.

With regard to Hall's suction disc, which is typical of the original "sucker" in its action, I can quote at least one case where its employment, in spite of its perishable nature, and its effect on the tissues, has enabled a patient to retain an upper palate under, apparently, the most hopeless conditions.

But turning to another aspect of "chambers," let me acknowledge their great use and importance where employed as a means of equalizing pressure—in such a case, for instance, as that of an edentulous upper jaw where the remains of the alveolar ridge is covered with soft yielding spongy mucous membrane, while the dome of the palate remains hard and resisting. In such a case I believe a chamber will prove of the greatest service.

Having touched lightly the fringe of what might be said on these interesting topics, I will conclude by saying a few words about "artificial rugæ," or "corrugated strengtheners," in association with suction plates; and with your permission, Mr. President, I will explain these models and specimens which I have brought with me, and which show clearly the method of preparing the strengtheners and the simplest way of modelling the rugæ. This must be done by hand to suit individual cases.

(*Explanation of Specimens.*)

The advantages offered by these gold strengtheners are many. The rugæ are congenial to the tongue, and the use of the strengthener, besides imparting an artistic appearance to the piece, allows the vulcanite to be cut away so as to afford more tongue room. The strengthener, when corrugated, gains much additional strength, especially if the arches be judiciously distributed, a piece of Ash's No. 4 gold plate being found of ample thickness when well corrugated to resist without fracture the greatest masticating force. Further, with strengtheners so arranged, chambers, if necessary, can be conveniently cut out after the piece is made, and in cases of close bite the teeth may be soldered to the strengthener. Examples of such cases I now beg to pass round for your inspection.

In conclusion, I feel that I ought to offer some apology for bringing so simple a matter before your notice; but I have found, in conversation with various professional friends, that the modifications of this ancient method of work which I employ in my own practice are not in very general use, and I shall be most happy to demonstrate them to any gentlemen to whom they may offer any points of novelty or interest.

Discussion.

The Chairman: Well, gentlemen, here we have a thoroughly practical subject for your consideration. I will not offer many words myself, but I must state that I have had an objection both to suction valves and air-chambers, and everything except the accurate fit of the denture. Where a good model has been taken, I have rarely had any difficulty in holding up a piece of work. I have seen some cases where much annoyance has been caused by the soft tissues growing into the suction chamber. Where you have a good fit, I repeat, you will have little difficulty in holding your case up.

Dr. Walker: I think, Sir, we are much indebted to Mr. Hepburn for his kind services in introducing the subject. So far as my experience goes, Sir, in regard to suction chambers, Mr. Hepburn has hit the point completely, but when we get thoroughly edentulous upper maxillæ with very greatly absorbed surfaces, the suction chamber becomes necessary to retain the plate *in situ*. Again, Sir, Mr. Hepburn speaks of the soft tissues freely passing into the suction chamber, but I think he omitted to say that if the dentures are only worn sixteen hours, the repair of the night will remedy this. He also omitted to say that the described corrugation of the palate is very easily produced by Turner's flask.

Mr. A. Kirby (Bedford): My own experience coincides with yours, Sir, if great care be taken to prevent hard pressure on the median line. After taking a careful model I find it an advantage to fit the piece into place with an ordinary piece of blue manifold paper. It marks the precise line where there is excessive pressure. In addition to this, I always use a modification of what we know as the Fulsome

ridge. I think it was described by Mr. Walter Campbell, and I at once adopted it. I do not make the spurs pass round the whole of the palate, but only on the soft tissue on either side. Even when the palate is very flat, I find it is the only expedient necessary.

Mr. G. Brunton (Leeds): Some years ago Mr. Fletcher said his idea of a suction plate was to have a large number of small cavities distributed over the plates. Following this idea, I made plates accordingly. Passing a piece of sand-paper with the gold plate through the rollers produces the reticulated surfaces. I have some hundreds of these plates in use now.

Mr. J. Fairbank: I think Mr. Hepburn's remarks are of great value, and very correct. I think suction chambers are not needed in artificial dentures. I have never on a single occasion made use of them myself. I think they only weaken the plate and make it feel thicker. I think a very useful thing to do in whole dentures is to scrape the palate on each side of the median line; if you examine the palate in most mouths you will find that on each side of the median line the mucous membrane is very much softer and the palate is thicker than on the ridge. Where I find the suction fail in suction plates it has been from the plaster warping; if the plaster is not good it will sometimes do this.

Dr. G. Cunningham: I should like to say a few words as a patient. Unfortunately my upper jaw is all but entirely edentulous, as I have only two wisdom teeth left. I made some experiments in my own mouth some years ago with a view of ascertaining whether it was possible to make that desideratum of all patients, a narrow suction plate. I tried a long, narrow, curved suction chamber just inside the palatal surface of the alveolar border. After considerable perseverance I was able to wear it perfectly well, but I found no advantage in it, and I came to the conclusion that the patients' notion as to the smallness of the plate is a false one; and further, from previous experience that there is no necessity for

a suction chamber at all. I may tell you that I have been something of a victim to suction chambers since I found that there was a gradual and continual enlargement on the palate corresponding to each successive chamber. That enlargement has not increased in my own case since I found that it was not at all necessary to wear a suction chamber, and that a spur modification of the Fulsome ridge answered perfectly well. In determining the position, the height and breadth of the ridge, an examination of the mouth should be made with a blunt instrument, such as an egg-shaped burnisher, to ascertain the softer and thicker parts of the tissues covering the palate. With regard to suction discs themselves, I think that Land's is the best. He also recommends the spur arrangement as well, and advises the largest possible disc. The writer of the paper requested some information with regard to suction valves. I remember on one occasion having a very troublesome case: the plate was a very heavy one, and I was anxious to try some discs of soft rubber; I did so, and it was a disastrous failure. I think suction valves might possibly be of some use for the retention of temporary plates where much absorption was anticipated.

The Chairman then called upon Mr. Kirby for his paper.

Electrical Progress and Dental Practice.

By A. Kirby, L.D.S.

It is a very easy matter to propose to oneself the preparation of a short paper, upon such a subject as the one I have had the temerity to venture upon, but various difficulties of a more or less formidable kind present themselves as soon as the task is taken seriously in hand. The first is to decide whether the matter shall be treated in a popular manner, or whether a considerable acquaintance with it shall be credited to those who may have the patience to hear, or read what has been written.

Several considerations, not the least of which may be the state of the writer's own knowledge, point rather to the former course, and I will not apologise for adopting it, because few persons would look for very advanced treatment of such a wide subject in the time which is at our disposal.

We are accustomed to hearing that "electricity is the power of the future," but those who use the phrase do not attach any very definite meaning to it, and the idea which is suggested by it is not

altogether a correct one, for electricity is not a source of power or energy in the same way that fuel, or wind, or a head of water may be considered so. Its real value consists in the ease with which it can be transmitted from place to place, and the facility with which it can be converted at will into mechanical motion, or employed for purposes of illumination, and for those uses its value can scarcely be over-estimated. Before, however, it can be employed for these or any other objects, it is necessary to obtain a supply by setting it at liberty from combination with some form of matter, or by changing some other form of energy into that which we know as electricity; it is in accomplishing the latter purpose that the most important improvements have been made during the last three or four years.

In the earlier days of electrical science and practice, a current was produced only in the first method indicated, by means of galvanic batteries, and the attention of many workers is still directed to endeavouring to obtain a supply from such means, but hitherto it has not been found possible to carry any of them out on a very large scale. When seeking some two or three years ago for the best method of getting even the small supply necessary for operating dental motors, &c., I investigated most, if not all, of the known types of battery, including those on the most recent

principles, and was greatly disappointed to find that all of them were the subjects of some drawback which unfitted them for the purpose: some were troublesome and dirty to charge and discharge, others required the removing of plates from the fluid when they were out of use, and many, if not all, were the subjects of rapid deterioration. The results of these experiments were confirmed in a very perfect manner by some which were made at the same time to test the utility of batteries for electric lighting, an account of which was published in the scientific periodicals after their termination.

The conclusion I arrived at was that storage cells offered the best means of supplying our requirements, and on different occasions I have advocated their use; at the present time, where obtainable, they are very frequently used.

Unfortunately I had no convenient means of getting storage cells charged, and as the Lèclanche battery in use showed some of the usual battery defects, in the course of time I made some further trials which included a "zinc carbon" pair in diluted sulphuric acid; this answered so well that more cells on the same plan were tried, but for some undiscovered reason none of them gave the same good results, although many various samples of gas and artificial carbons were used.

One well-known battery, that of Smee, had not

been tried up to this time on account of its low E.M.F., although it is spoken of by Spague as "one of the most valuable gifts ever made to electric science;" it was therefore thought deserving of attention, and one was set up and charged. At first it did not seem very promising, but as soon as the diluted acid had become quite cold it gave a very good current, and with it an electromotor answered in every way satisfactorily. Here then appeared to be the solution of the difficulty of obtaining current for small motors by means not inferior to a storage battery. Certain small difficulties, however, still remained, such as the necessity for frequent amalgamation of the zincs, and the unpleasantness of handling the acid; these, however, were all surmounted, and the battery has been in constant use for nearly two years, which has given a good opportunity of proving its advantages, and of these I am obliged to speak very highly. When once charged it remains in action for a very long time—weeks or months—according to the size of the cells and the amount of work they are called upon to do. The zincs, if properly prepared, will go for a year, or until worn out, without requiring re-amalgamation, and it is not necessary to remove them from the fluid when they are not at work. It requires less trouble to re-charge the whole battery than to clean and charge one cell of any ordinary double fluid

battery. I have dwelt at considerable length upon this battery, because it is not improbable that with the storage cell it may prove to be our most suitable and useful source of power.

I need hardly tell you that the greater part, practically the whole, of the current which is used for electric lighting and for large motors is obtained from steam, or water power by means of dynamos, or machines which convert mechanical into electric energy. Great part of the advances in electric practice during the last three or four years, of which we hear so much, consist in the improvement of these machines, but, paradoxical as it appears, these improvements are made up, according to Sir Frederick Bramwell, of "next to nothings," comprising such details as shortening the electro magnets which form the field, and making them considerably larger in diameter. The effect of these alterations is well shown in their application by Dr. Hopkinson to Edison's dynamos, the output of which is thereby practically doubled with the consumption of the same amount of H.P.

The improvements just named have special reference to machines which produce a *continuous* current, or a current always in one direction; but, unfortunately, it is by no means a settled point whether a continuous or an intermittent current is the most advantageous, as witness the fierce war which is being waged at the present moment

between the advocates of the rival plans, each of whom claim especial advantages for their own methods. There is yet another most important matter, indeed a fundamental one, which is not yet settled, and that is the best way of distributing the one or other kind of current when it has been obtained. This has so far been a great obstacle to the extended use of electricity in England, but there are other reasons which it may be interesting to look at, although they do not strictly belong to my subject; perhaps the most important of these is the abundance of coal, and consequently low price of gas, in England. Electric light cannot compete with gas if the latter is produced much below 5*s.* per 1000 feet, but it is cheaper than gas when, as in some parts of America, the price approaches to 10*s.* per 1000 feet.

Another reason for the more extended use of electricity in America as compared with our own country is that our energetic cousins do not wait for a thing to be theoretically perfect before they put it into actual practice, whilst we are slower, and like at all events to *think* that we have arrived at something nearly approaching to perfection before we receive any novelty into daily use.

Having glanced at the different sources of supply, they must be dismissed with a very few words of comparison.

Concerning primary batteries enough has been

said. Of storage cells it need only be added that they are daily coming into more extended use; some very large buildings are entirely supplied by their agency, and they are extensively employed for propelling tram and railway cars, and have for those and other purposes the advantage that each car, or train, or motor, is independent of any outside connections. Large batteries of them are also used in connection with a dynamo as reserves for power or current in case of a breakdown in the generating machinery, and under these circumstances do away with the necessity for a duplicate set of apparatus which would otherwise be necessary.

Of course storage cells require the use of a dynamo to charge them; there is a certain small amount of loss in the process, and some care is necessary to prevent their being too much exhausted.

The next plan to be mentioned consists in using a continuous current directly from the dynamo, which can only be used whilst that machine continues to be at work. As the Electric Lighting Act does not allow the current to be taken into a house at a pressure of above 110 volts, the extensive use of this kind of current calls for the employment of very large conducting wires, or rather copper sheets or bars, so that there is considerable difficulty in its distribution upon a very extensive scale.

Being the kind of current we require for the description of motors at present in use, it has of course been proposed and to some extent employed for those of the very small size we need for our work; but, unfortunately for us, so high an electro-motive force is not the most suitable condition of current to be supplied to them, and it is for this reason that primary and storage batteries are desirable for us.

To overcome the difficulty due to the necessity for the large conductors which are required to carry a quantity of low tension continuous current, an entirely different method of supply is largely used both in America and in other places; this consists in generating a current of very high potential which can be carried in large quantity through a very small conducting wire, and converting it into current of very much lower potential before it is carried into the houses where it has to be used. It is not very easy to "transform" continuous currents, the plan adopted is therefore to use a current of the alternating kind which is very easily changed from a higher to a lower potential.

In the case of some of the very large works which are now being constructed, the original E.M.F. of the current is as high as 10,000 volts; this is reduced at distributing stations to about 2,400 volts, and finally to 100 as it passes into the houses. There is, no doubt, very much to be said

in favour of the plan, but its opponents state that its use is attended with very great loss and waste, and that the machinery is apt to become overheated, and so destroyed. The original pressure is of course highly dangerous, but its advocates say that they have overcome all these difficulties, or that they are of little moment. On the other hand, there appears to be the possibility of serious objection on behalf of the Post Office authorities, who have it in their power to veto any plan which is likely to interfere with their telegraphic or telephonic arrangements.

As a source of motive power the alternate current does not possess much special interest for us, because it will not work the existing forms of motors. Two or three inventors, however, claim to have devised machines for using alternating currents which profess to have some advantages even over the continuous current motors already in use, but up to last week nothing has been actually seen of such an apparatus which would start without being started.

With respect to the transformation of continuous currents from a high to a low potential, there are, I believe, some methods in use, including what is known as the motor dynamo : these, like the others already named, occasion some loss of power.

To the public generally the most important use of electricity is for procuring light without injury

to the air of the room in which it is employed, but past its obvious advantages with which we are familiar, it does not possess any special claim to notice except to mention in passing the new form of glow lamp lately introduced by Messrs. Swan and Edison; it is composed of a number of coils of filament, and produces a very concentrated light suitable for use with a condensing lens for illuminating enlarged microscope images, and for other similar purposes.

As a source of power, or rather as a means of transmitting and utilising it, electric currents may be valuable to us in our workrooms, but its especial use to us consists in the great facility it gives us, and the labour it saves us in our daily operations, by giving motion to our burring engines. In these respects its value can only be appreciated by those who have employed it.

Up to a very recent time the principles on which electro-motors should be constructed were very imperfectly understood, and at the present time there are two schools of designers, the one holding that the best dynamo is at the same time the best possible motor, and the other taking the view that the improvement in motors has been very much retarded by the attempt to adhere too closely to the lines of the best dynamos. Amongst those who do not altogether take the former view are, I believe, Professors Ayrton and Perry, and Mr.

Albion Snell, whose recently published paper on the subject is most valuable and suggestive. The works of Professor S. P. Thompson and of Mr. Kapp, on the electrical transmission of energy, are also amongst the best authorities on the subject.

Our motors, however, are on such a minute scale that it seems going beyond the mark to investigate the rules which are laid down for the construction of the vast engines now coming into use, and we are constantly told that the rules which apply to large motors do not apply with equal force to very small ones. There are certain principles, however, which must underlie all of them—for instance, a piece of iron of a certain sectional area should only have a certain number of turns of wire, or rather a certain number of "ampère turns" of current passing round it, because if you increase the current beyond the amount which is required to produce magnetic semi-saturation, a great part of the extra current is wasted. For this reason motors of too small size are very wasteful; and this is important if a battery is employed, because we want each charge to last as long as possible. In designing a motor a certain amount of practical knowledge is necessary, and according to Mr. Snell, if you know the power of a certain motor, a rule-of-three sum will help you to the details of the one you require.

It is now some four or five years since I began

to look into the matter practically, and after some refreshing reading, and buying a not very satisfactory motor, to try what I could do for myself in the way of contriving and building one. Various considerations led to the selection of the type, which was that of a machine made by Jacobi, and used successfully to propel a boat on the Neva more than fifty years ago. My machine had governors to regulate the speed, and an automatic switch to cause it to start as soon as the point of the instrument which it carried was brought nearly into contact with the spot upon which it is required to operate.

When put into actual use the power required was not quite sufficient, but after laying aside for some weeks, a modification of the poles increased it so much that in the absence of the governors, which had been removed in the interval and almost forgotten, it was found to be too impetuous and had to be restrained. After a difficulty about self-starting without dead points had been got over, it was taken into regular use, and has been employed almost continuously ever since its completion. Indeed it answered so well that it was proposed to have similar ones made for other operators who might wish to use them, but the difficulty of getting them made, and arranging for their distribution, caused the matter to be laid aside for the time. Although Professor S. P. Thompson, in the new

edition of his Dynamo Electric Machinery, speaks of Jacobi's motor as in fact a very advanced type of dynamo, differing very little from one of Wilde's most successful forms, it is always spoken of as being inferior to some of the more recent types. All the persons who were consulted, and whose opinions were considered to have weight, thought that it was possible the modified Jacobi might prove to be the most suitable plan for small motors ; it, was however, thought to be worth while for the sake of comparison to have some motors made on the most recent ring armature principle. The Pacinotti type was chosen, and the proportions decided upon were found to agree with some of the best large machines. I have brought one of them with me this evening, which can be seen at the close of the meeting.

A motor of the earlier type is here also, and a comparison of the two is not without interest. It will be seen that the ring motor is of larger size, but it has fewer turns of wire ; it also takes rather more current and runs at a higher speed, but it does not develop so much power, and this is especially noticeable at lower speed. Both motors have the same arrangement for automatic starting and stopping, as well as centrifugal governors by which the speed is adjusted and regulated, and either of them can by a very simple method be stopped instantaneously when running at their highest speed.

From what has been said, it will be seen that the old principle possesses some very considerable advantages. The one shown has the drawback of being rather noisy in consequence of being enclosed within a brass protecting case, but that is not a necessary part of the apparatus, and is easily altered. The battery used is one of those mentioned in the earlier part of the paper.

In reference to the supply of current to small motors, it will be seen from what has been said that for those already in use (and we cannot say much for those which may possibly be brought to perfection some day) it must be of the continuous kind, such as that from a primary or secondary battery, or from a continuous current dynamo; and further, its intensity must bear some exact proportion to the winding used upon the motor, because the latter, if wound to use a current of high potential, would not work with a current of low E.M.F., and *vice versâ*. We must therefore, before starting, decide which is best, and for small motors there is no doubt the E.M.F. must not be too high, so that the current of a house-to-house supply, which will be about 100 volts, will be less suitable than that from a primary or a storage battery, going say from eight to twelve volts. With a moderately high current a slight shock is sometimes felt, but a motor supplied with a very high potential current can only be stopped with

safety to the user after the current has been considerably reduced.

The value of electricity on the treatment of disease is perhaps rather outside the scope of my subject, and is a side of the question which is usually looked at with some suspicion, some of the apparatus which is popularly advertised failing to give the smallest indication of electric current. One is tempted, however, to allude to the treatment of fibroid growths with a moderately strong current which seems to be successful. The greatest interest, however, attaches to the apparent success which has attended the treatment of some cases of cancer. For this purpose the rather high E.M.F. of 105 volts has been employed, and a quantity of about 0·6 ampère. The potency of this is rather striking when we consider it represents rather more than $\frac{1}{1\frac{1}{2}}$ horse electrical power, and would be sufficient for the production of an electric light of about twenty candles power.

If the theory be that cancer cells possess a lower vitality than healthy cells, and that growth may be arrested by an agent which is harmless to the surrounding tissues, we can well understand that the means used are not out of proportion to the end desired.

Description of Apparatus.

Mr. Kirby, in demonstrating the features of the apparatus, said that the battery was one of the old-fashioned Smee type slightly modified. Its advantage was that when once charged it would go for a long time. When the motor was not in use there was little or no waste, and it answered instantly when connection was made. The plates were raised from the fluid in a simple manner on the same principle that a window is hung in its frame by balancing weights. In order to facilitate charging he had had a special form of glass-measure made with an outer cup to it which caught any drops of acid which might trickle over the sides of the inner cup. He claimed that the whole of the cells might be charged in ten minutes. Each of the cells was made separately. It was preferable to attach the platinized silver plate to an ebonite board. Each plate weighed about a lb. $3\frac{1}{2}$ lbs. zinc were equal to 1-horse power. With ordinary usage the battery would last for several months. The current was carried by leading wires to the motor—the size of the leading wire was important; it was impossible to have too large a one. With reference to the motor, his own feeling was about burring engines that they should work at a slow speed. His motor was made with an internal governor; scientifically that was not the best form for a governor, but the scientific way only admitted of one speed.

Discussion.

Mr. G. Brunton (Leeds): I should like to say that I am highly delighted with Mr. Kirby's paper, and am quite repaid for having left a rather busy practice to come and hear it. His motor comes nearest to what I think a motor ought to be, but I hope to see it even improved. I would like to see one so light, so small, and compact that it might be mounted on one's shoulder.

Mr. C. J. Boyd-Wallis: Mr. Kirby in his very interesting paper has left us little to criticise, but there are one or two points he has just touched upon, and upon which I should like to make a few remarks. I think it is an important point, and one which is nearly always overlooked by amateurs, and sometimes by practical electricians, in the make-up of a battery to arrange the cells so that their internal resistance shall equal the resistance of the circuit, so that the maximum current for a given circuit may be obtained.

With regard to transformers, electricians are devoting their energies to the discovery of the best methods of constructing these instruments, and I am informed that it is likely we shall soon have an instrument which will enable us to transform the current in the leads for the powerful mains to our own houses and use the same with perfect safety. Transformers employed to transform either direct or alternating currents of high electro-motive force (of, say, 200 volts) should be placed in a fire and moisture-proof casing. The leads conveying currents of high E.M.F. inside buildings should be specially and perfectly insulated, and with the positive and negative terminals some twelve inches apart.

There is one other point Mr. Kirby has just touched upon, viz., the treatment of tumours. In the treatment of fibroid and other growths, I consider it a very important point that the resistance of the patient should be ascertained, for the resistance of the human body to the passage of the electric current differs so enormously in different individuals and indeed in the same individual under varying conditions of health, and at different periods of the day, that it will be readily understood that what may prove a very big dose of electricity to one individual may prove practically *nil* to another.

Mr. Kirby: In reply to the last speaker, I may say that the necessity of the external and internal resistance being the same is not exactly as I understand it. It is advantageous to have your external resistance considerably higher than your internal. By far the most economical way of using your current is to use it with a very high external resistance. Then, as regards transformers, with an intermittent current they are very near perfection, but with a continuous current this is not so. With regard to tumours, the quantity of electricity passing through the tumour can be accurately gauged. Dr. Parsons, in his article in the *British Medical Journal*, says that he commences with a very low quantity, and he reads from a galvanometer as he increases it.

Mr. Boyd-Wallis: It is only quite recently that medical men have adopted the practice referred to; hitherto they have used one 6-cell battery.

The Chairman: It now devolves upon me to thank Mr. Kirby for his interesting and valuable paper. It is not the first time that we have been benefited by his experience and his excellent judgment. We have also to thank Mr. David Hepburn for his paper, and the other gentlemen for their communications. The last meeting of the session will take place on the 3rd June, when a paper by Dr. Ferrier, F.R.S., will be read on "Some Relations of the Fifth Nerve";

a Casual Communication by Mr. Scott Thomson on "A Case of Irregularity"; also one by Mr. J. Robinson and Dr. George Cunningham, "A Few Preliminary Remarks on the Occurrence of a Crystal-forming Micro-organism in the Mouth."

Odontological Society of Great Britain.

ORDINARY MONTHLY MEETING.

June 3rd, 1889.

MR. HENRY SEWILL, M.R.C.S., L.D.S.,

PRESIDENT, IN THE CHAIR.

THE Minutes of the preceding meeting having been read and confirmed,

The PRESIDENT announced that Mr. George T. Parkinson had stated his intention of resigning the ordinary membership of the Society, owing to failing health, which obliged him to retire to live in the country. The Council had determined to recommend to the Society that Mr. Parkinson should be elected an Honorary Member, as he had been among its most staunch early supporters, and had done very much for its welfare in its younger days when its friends were fewer. Mr. Sewill felt that all would regret the cause of Mr. Parkinson's resignation, and would hope that ere long they would again see him amongst them.

MR. BROWNE-MASON had known Mr. Parkinson for very many years, and he knew the Odontological Society never had a truer friend than he, or a more helpful and loyal supporter. Mr. Parkinson had always been ready to assist the younger men in his profession, and so he knew there were many of his friends present.

MR. G. T. PARKINSON was proposed and elected an Honorary Member by acclamation.

Mr. Sidney Spokes, having signed the obligation book, was formally received into the Society by the President.

Mr. Charles Winterbottom, M.R.C.S., L.D.S., of 16, Sloane Street, S.W., was balloted for and duly elected a Resident Member of the Society.

Dr. George Cunningham (Cambridge) and Mr. H. Robinson read a note

On the Formation of Ammonium-Magnesium Phosphate by Micro-organisms.

The authors desired to call attention to the observation, originally made by Mr. Robinson, of fine, well-formed crystals being formed in many tubes of nutrient gelatine and agar-agar, in which cultivations of micro-organisms were growing. Some micro-organisms produced crystals in two or three days, notably some from the human mouth; others only after some weeks. On analysis the crystals proved to consist of the double Ammonium-Magnesium phosphate, or so-called triple phosphate (NH_4,Mg.,PO_4,$2H_2O$). Mr. Solly, of Cambridge University, had also examined their crystalline form and found them identical with that of the mineral Struvite. The evidence, on the whole, seems to point to the direct formation of the ammonia by the micro-organisms from the mediums in which they were growing, and to its combination with the magnesium phosphate already existing in the nutrient substance to form the double phosphate. The authors think the deposition of tartar on the teeth, and the formation of some calculi in other parts of the body, may be due, in part at least, to this action produced by micro-organisms. They purpose continuing their investigations with a view of elucidating this point in a more extensive communication.

Photographs, crystals, and cultures were exhibited.

At the suggestion of the President, discussion was deferred until Dr. Cunningham's fuller communication could be read before the Society.

The Secretary, for Mr. J. Charles Storey (Hull), read the following :—

Report of Fracture and Treatment of the Incisive Portion of the Superior Maxillæ.

On the 27th of April, 1889, Clive S ——, a little boy, aged eight, in good health, was referred to me by the family medical attendant, to whom he had been taken for fracture of the superior maxillæ. I saw him about two hours after the accident. The four superior incisors were projecting forwards at an angle of about 45°. Very little swelling or hæmorrhage had occurred. On enquiry, I found that when out with the nurse he had in play jumped from an elevation of about two feet, evidently with his mouth open, and had struck against the cross-bar of the perambulator. On examination I found that the fracture appeared in the lines between the intermaxillary bones and the superior maxillæ.

I at once sent for the medical man, who administered chloroform, after which I reduced the fracture. The projecting part, with some little difficulty, yielded to steady backward pressure, and when started went almost into position with a palpable click. It did not, however, go perfectly close. I then took impressions and made a vulcanite plate capping the molar teeth, to raise the bite; to this I attached a dental alloy retaining-band carefully fitting, with pressure, the anterior surfaces of the incisors: this for the purpose of pressing and holding in close juxtaposition the fractured portions. This has been worn almost continuously for about a month. The parts are quite firm, union appearing to be perfect—there is no discolouration of the incisors, the pulps of which seem to be living.

Mr. Betts remarked that he had met with a somewhat similar case. His patient, a gentleman, had, whilst performing the duties of an amateur bell-ringer, met with an accident. He was lifted off his feet and dashed by the back swing of the bell into the belfry, and struck his jaws against a projecting beam. The upper jaw was smashed, the

incisor portion being dislocated. Under gas the displacement was reduced and the case did well. The pulps of the dislocated teeth were, however, dead, giving no response when tested with hot or cold fluids.

The PRESIDENT remarked that fracture of the jaw when occurring in children always did better than the corresponding injuries in adults. He called upon Mr. Browne-Mason for his communication.

MR. BROWNE-MASON said: Mr. President and Gentlemen: The interest that I think attaches to the happily unusual sequence of tooth extraction I bring before you to-night, is my excuse for the following statement, that I think may be interesting to this Society.

On Saturday, May 25th, Harriet Leach, an agricultural labourer's wife, forty-three years of age, attended Okehampton Market that morning apparently in ordinary health; she went to her usual medical attendant, Mr. Burd, for the removal of the root of a tooth, as she was suffering from neuralgia, when the operation was followed by death eight hours after, under the following circumstances. (I quote from the medical evidence at the subsequent inquest.)

Mr. George V. Burd, surgeon, deposed that Mrs. Leach came into his surgery on Saturday afternoon, and requested him to take out a tooth, as she was suffering from neuralgia. He told her he did not think it would relieve her neuralgia, but she still expressed a desire to have the tooth extracted, and he consented to do so. It was a small stump, which came out without difficulty. Deceased afterwards washed her mouth out with some water, and then became a little hysterical. Witness moistened her face with a wet towel, and suddenly her breathing stopped. With the assistance of Mrs. White he laid her on the floor. Deceased did not faint; her breathing simply stopped, although her heart continued to beat. Artificial restoration was resorted to and continued for eight hours. Death took place at half-past eleven o'clock. Except artificially, she did not breathe during the whole of the time which elapsed until her death. In his opinion she died from apoplexy. He had attended her for three or four

years. She had always complained of neuralgia, headache, and giddiness, and at times could not keep her head up. One of the small blood vessels at the base of the brain was probably ruptured, causing pressure on the nervous centres, which stopped her breathing. Any slight shock might have produced the rupture. Mr. E. H. Young, surgeon, described the condition of the deceased when he was called in to assist at half-past five o'clock. She was quite unconscious; breathing had ceased, but the heart was still acting. Everything possible was done to restore animation. He concurred with Mr. Burd as to the cause of death, and added that the blood vessel might have been broken without any shock at all. The jury returned a verdict of "Death from natural causes."

I wrote to Mr. Burd, asking him if there was anything he could add to this report, and he replied as follows:—

"The newspaper report is correct. The woman had suffered from severe headache for several years, and in all probability had an aneurism at the base of the brain, which of course was not detected during life, the rupture of which caused the paralysis of the breath centres. I have no doubt that many cases of apoplexy are fatal in the same way, only that no medical man is present to perceive that the heart is still acting, and therefore they die at once."

The point of interest to us is that there is apparently nothing to indicate the existence of such apoplectic tendency as existed in this case; but fortunately such cases are very rare. I never came across such a sequence in my neighbourhood, in either my own or fellow-practitioners' experience. It is I think a matter open to discussion as to whether an anæsthetic in such a case would have averted the effect of shock. My own idea is that nitrous oxide, through its action on the brain, may have in such a case proved in itself fatal, and that this would be a case where there would have been less risk to life from ether or chloroform inhalation.

Mr. Sewill felt the value of the case was greatly lessened, as no autopsy had been held. He could not understand how any coroner could allow such a case to be enquired into, and

yet omit to get medical testimony as to the post-mortem condition of the patient, as the whole question of how the individual met with death hinged upon what would be discovered at a necropsy. Any discussion about the matter would be, Mr. Sewill thought, absolutely idle, as they could only speculate, but were unable to prove anything. Dr. Ferrier, whose special knowledge of brain lesions might assist them, would perhaps explain what condition he should expect to find judging from the clinical evidence before them.

Dr. Ferrier said he could only re-echo what had fallen from the President; he felt any discussion upon the facts was simply a waste of time. Dr. Ferrier thought they were quite without evidence whereby to answer the question Mr. Browne-Mason had put as to whether nitrous oxide would have been prejudicial or dangerous in the case. The best authorities were quite doubtful as to whether a death had ever occurred directly traceable to nitrous oxide gas, so that he should hesitate before saying that agent would have been contra-indicated in the case in point.

The President then called upon Dr. Ferrier for his paper on some Relations of the Fifth Cranial Nerve.

On some Relations of the Fifth Cranial Nerve.

By David Ferrier, M.D., F.R.S.

Gentlemen,—When your President asked me to address you on some subject connected with Odontology, my first impulse was to decline, on the ground that I was altogether incompetent to discourse to you on any subject connected with your specialty. But when he assured me that Odontology included not only teeth, but also everything connected with the oral cavity, I thought that I might venture on some communication which might fairly be included within this comprehensive definition. I have chosen as the subject of my remarks "Some of the Relations of the Fifth Cranial Nerve," and have done so, not only because the fifth nerve is *the* nerve of all others with which you have to deal, so far as your work has a neurological aspect, but also as I should like to bring before you some recent observations, both of my own and others, tending to throw new light on the physiology and pathology of this nerve.

The fifth cranial nerve has been, since the time of Sir Charles Bell, regarded as homologous with a typical spinal nerve—the anterior root being formed by the portio minor or motor division, the posterior root being formed by the portio major, with its Gasserian ganglion homologous with those on the posterior roots of the spinal nerves. And indeed, it was by the effects of section of these two roots respectively, that Sir Charles Bell first demonstrated the accuracy of his views regarding nerves of motion, and nerves of sensation.

But we have recently learnt, more particularly by the researches of Gaskell, that the assimilation of the fifth nerve to the type of a spinal nerve with its anterior and posterior root is erroneous when viewed from the standpoint of homology. And indeed the whole of the current conceptions which we have been taught concerning the constitution of the spinal nerves and their relations to the sympathetic system require to be considerably modified. We have been taught to regard the anterior roots as nerves of motion, and the posterior roots as nerves of sensation, and the sympathetic chain of nerves and ganglia as a system more or less independent of the cerebro-spinal nerves. But Gaskell has shown us that the spinal nerves consist of two distinct systems differing in their origin, their size, their mode of

distribution, and their functional relationships. The one division forms the *somatic* system of nerves, which supplies structures derived from the epiblast, and from that part of the mesoblast which forms the mesoblastic somites, or, in general, the muscles and structures of animal life. These somatic nerves consist of an efferent or anterior root derived from the anterior horn of the spinal cord, and distributed to the skeletal muscles; and a posterior, or ganglionated, root which is distributed to sensory organs. The other division forms the *splanchnic* system of nerves, which supplies structures derived from the hypoblast, or, in general, the muscles and structures of organic life; or in other words the muscles of the visceral skeleton and the walls of the blood-vessels and hollow viscera. These last are distinguished from those of the muscles of animal life by the smallness of their calibre (varying in size from 1·8$^{\mu}$ to 3·6$^{\mu}$). The splanchnic system, like the somatic, is also composed of different fibres. The former, that is the afferent, are ganglionated like the corresponding roots of the somatic system. Of the efferent, some pass direct to the muscles of the visceral skeleton, and these include the muscles of the face, jaws, and others included by Sir Charles Bell in his respiratory system. The others (the visceral nerves proper) pass at some part of their course into ganglia before they reach

their final destination. The ganglia of the efferent system of splanchnic nerves constitute what we have been accustomed to call the ganglia of the sympathetic system. These are variously situated, some near the origins of the nerves, and others at a varying distance nearer or further from the periphery. These ganglia are essentially vagrant in their character, and thus differ from those of the posterior roots, which are always situated close to the emergence of these roots from the spinal cord.

The differentiation of the spinal nerves into somatic and splanchnic divisions, and the relation of the latter to vagrant peripheral ganglia, throw a new light on the functions of certain cranial nerves respecting which there has been hitherto considerable diversity of opinion. When we look at the cranial nerves proper we find that the third, fourth, portio minor of the fifth, sixth, and seventh nerves, which are now purely motor in function, were at one time complete segmental nerves, that is to say, they were composed both of an efferent and afferent root. But in process of evolution the afferent root, with its ganglion, has undergone degeneration, though, as Gaskell has clearly shown, the remnants of the ganglion are still capable of being demonstrated at the point of emergence of these various nerves respectively. Hence the portio minor, or motor division of the fifth nerve,

is not homologically the anterior root, of which the portio major with its Gasserian ganglion is the sensory, but is a fully formed segmental nerve, of which the sensory division has undergone complete degeneration. The sensory divisions of these various nerves, viz., third, fourth, fifth, sixth, seventh, have been replaced by the sensory branches of the fifth nerve. The motor division of the fifth, and the facial or seventh, are essentially splanchnic efferent nerves, for the striated muscles which they supply, namely those of mastication and expression, all belong to the visceral group of muscles. In the facial nerve there are large and small fibres, the larger fibres being the nerves of the facial muscles, while the fine fibres which come from the *nervus intermedius*, or nerve of Wrisberg, enter the geniculate ganglion, and from thence pass into the greater and lesser superficial petrosal, and the chorda tympani. It would thus appear that the nerve of Wrisberg, and its branches *viâ* the geniculate ganglion, constitute a splanchnic nerve probably wholly efferent in function.

I will return to this point when speaking of the supposed relations of the chorda tympani to the sense of taste. Meanwhile let us direct our attention to the nerves of the medulla oblongata. The hypoglossal, or twelfth cranial nerve, is the only somatic efferent nerve; all the others, viz., the glosso-pharyngeal, vagus, and spinal accessory,

are essentially splanchnic nerves, afferent and efferent.

The glosso-pharyngeal and vagus innervate the alimentary canal and viscera, from the pharynx as far as the hind gut and its appendages.

The somatic afferent branches of the nerves of the medulla oblongata, with all their complicated visceral relations are contained in the sensory division of the fifth, which arises in close relation with the posterior horn as far down as the middle of the cervical region.

These morphological data seem to me to have an important bearing *inter alia* upon the pathology of what are termed sympathetic or reflex neuralgias of the fifth nerve. Thus it is well known that visceral irritation, unless reaching a high pitch of intensity, is obscure and non-localisable, whereas it is apt to project itself and become expressed in some somatic region, the central origin of whose nerves is in close relation with those of the viscera in question.

This is a sympathetic or reflex neuralgia; and from the central relations of the fifth nerve to those of the viscera, we may explain the head-aches, toothaches, and other neuralgias of the fifth which are known to arise in connection with various forms of visceral disturbance. What should direct the incidence upon one branch of the fifth nerve rather than another, under such

conditions, is perhaps not quite clear, but I think we may assume that if there are any causes of irritation already existing in any region supplied by the fifth, such for instance as a carious tooth, exposure to cold, &c., these will cause a predisposition to the localization and expression of visceral irritation in this particular part. Thus an irritable tooth may at any time become the seat of intense pain under conditions of visceral derangement; and a similar explanation is applicable to headaches, and other forms of trigeminal pain apt to occur under like circumstances. The locality of trigeminal pain is by no means always an index of its local origin. For as stomachic derangement may be the cause of frontal headache while the stomach itself is free from pain, so a general neuralgia of the fifth may have its origin in some related visceral nerve, or in some branch of the nerve itself, such as a dental branch, which is not itself the seat of conscious suffering. Instances of this must be familiar to you all; they are certainly in accordance with my own experience.

Among some of the relations of the trigeminal nerve on which I desire to make a few remarks this evening, I would first allude to the supposed relation of the fifth to the muscles of the palate. It has been assumed by some that motor fibres from the fifth supply certain muscles of the palate,

viz., the levator palati and azygos uvulæ. It is, however, more generally believed that the motor nerves of the palate are not inherent in the fifth nerve, but are derived from the seventh or facial nerve through the greater and lesser superficial petrosal nerves, by way of Meckel's, and the otic ganglion respectively. These muscles, it is said, are apt to become paralysed by lesions of the facial at, or above, the geniculate ganglion; and in fact it has been laid down in important text-books as a canon of diagnosis that facial paralysis, accompanied by paralysis of the soft palate, indicates a lesion of the seventh nerve in the position above-mentioned. We have, however, good grounds for believing that these views are entirely without foundation, and that paralysis of the palate never occurs from an uncomplicated lesion of the fifth, or of the seventh nerve in any part of its course. I have related a case of complete paralysis of the fifth nerve (*Lancet*, January 7th, 1888) in which the palate on the paralysed side was altogether unaffected. The motor innervation of the palate by the facial nerve was many years ago questioned by Hughlings Jackson (London Hospital Reports, Vol. I, page 336, 1864) on clinical grounds, and I have myself never seen any indication of paralysis of the palate in the numerous cases of facial paralysis which I have examined in this relation. The experiments of Vulpian (Comptes Rendus, CIII,

1886) upon dogs, as well as those of Beevor and Horsley on monkeys (Proceedings of the Royal Society, No. 278, 1888), have shown that no movements of the soft palate can be excited by stimulation of either the fifth or seventh nerves within the skull, whereas movements of the soft palate are readily excited by stimulation of the spinal accessory or accessorio-vagus. These experiments confirm similar results obtained by Volckman and Hein (*Müller's Archiv*, 1840, and *ibid.*, 1844), which seem to have been ignored by most clinical writers and observers. We may therefore take it as established beyond all doubt that the spinal accessory, and not the fifth or seventh, is the motor nerve of the palate. Paralysis of the palate is apt to be associated with paralysis of the vocal cord on the same side, owing to the community of innervation, and this condition is not unfrequently associated with paralysis of the fifth, as well as some others of the cranial nerves. In the following case, paralysis of the left side of the palate and the left vocal cord was associated with paralysis of the sensory and motor divisions of the fifth nerve, and, at a later date, by paralysis of the facial and sixth on the same side :—

David R., aged thirty-three, admitted under my care into King's College Hospital, March 29th, 1888. Previous history was unimportant. There was no clear evidence of specific disease.

In June, 1887, patient first noticed that hearing was becoming deficient in the left ear, and soon after he began to experience a buzzing sound in this ear. Then he began to have dull aching pain in the lower jaw on the left side, ceasing abruptly at the symphysis menti; the pain soon extended into the malar and occipital regions on the same side of the head. Thinking that this was due to a carious tooth, he had it extracted, but with no relief to the pain. Shortly after, he noticed that he had lost sensation over the left half of the face, and he then began to have pain in his left eyeball, which felt as if it were being compressed. In January, 1888, he had some swelling and tenderness on the left side of the neck below the mastoid process, probably glandular. About this time hoarseness of the voice came on, which has been gradually increasing, together with the deafness.

Present condition:—Slight drooping of the left eyelid; left pupil smaller than the right; a marked depression on the left temporal fossa owing to atrophy of the temporal muscle, and a similar condition of the masseter and mylo-hyoid muscle on the same side. On opening the mouth the jaw deviated to the left side (owing to paralysis of the left external pterygoid). The muscles of mastication had entirely lost their faradic excitability. The tongue, when protruded, deviated

slightly to the left side; this side of the tongue appeared somewhat puckered or scarred. There was considerable wasting of the left sterno-mastoid, and of the anterior border of the trapezius as compared with the right; and it was observed, at a later date, that there was paralysis of the left side of the palate, and complete paralysis of the left vocal cord. Hearing was defective in the left ear, but an examination by Dr. Pritchard showed that the auditory nerve was unaffected, and that the deafness was due to subacute local inflammation of the tympanic wall in the region of the ossicles. There was almost total anæsthesia and analgesia in the region of distribution of the infra-orbital and mental branches of the fifth nerve, also in the anterior two-thirds of the tongue, and of the mucous membrane of the inside of the mouth as far back as the arch of the palate. Sensibility was normal in the conjunctiva, and in the region of distribution of the superior division of the fifth. There was total abolition of taste on the anterior two-thirds of the tongue on the left side. His taste was impaired on the posterior third. Two months subsequently (June 1st) paralysis set in on the left side of the face, which in course of a few days became very marked, implicating all the muscles supplied by the seventh. With this there also occurred paralysis of the left external rectus. The patient left the hospital at this time, and I

have not been able to trace his subsequent progress.

The association of paralysis of the palate with paralysis of the fifth in this case might have been taken as a proof of the relation of the fifth nerve to the palate, but the affection of the left vocal cord, and of the left sterno-mastoid and trapezius muscles, at once indicated implication of the spinal accessory. This case shows, among other things, that paralysis of the fifth nerve completely abolishes tactile and gustatory sensibility on the anterior two-thirds of the tongue. Some cases have been recorded in which taste does not appear to have been affected in connection with disease of the fifth nerve, but these must be without doubt set down, if correctly observed, as instances of only partial lesion; and, on the other hand, some cases have been reported in which, with lesions apparently confined to the fifth nerve, taste has been abolished not only in the anterior two-thirds, but also in the posterior third of the tongue. The exact explanation of these cases is somewhat doubtful, but the probability is that they are not uncomplicated cases of lesion of the fifth nerve as such.

In the case which I have already reported (*Lancet*, January 7th, 1888), and alluded to above, of complete uncomplicated paralysis of the fifth nerve, taste was completely abolished in the

anterior two-thirds of the tongue, but retained in the posterior third in the region of distribution of the glosso-pharyngeal, also in the following case which came under my care some time ago (February 1st, 1884) at the Hospital for Epileptic and Paralysed, Queen's Square, the same facts are demonstrated.

Joseph M., aged thirty-three, exhibited symptoms of complete paralysis of the left fifth nerve, both sensory and motor divisions. There was atrophy and loss of faradic contractility of the temporal and masseter muscles. There was entire loss of sensation all over the left side of the face, conjunctiva, mucous membrane of the mouth, and the anterior two-thirds of the tongue. The tip of the tongue was, however, sensitive on both sides, and also the posterior third of the tongue. There was loss of taste for sweet, bitter, &c., on the anterior two-thirds of the left side, with retention of taste on the posterior third. Galvanic taste was also abolished on the left anterior two-thirds, and retained at the back.

There can be no doubt that the glosso-pharyngeal is the nerve of taste for the posterior third or base of the tongue. The proof of this, however, depends more on anatomical and experimental evidence than upon clinical facts—isolated disease of the glosso-pharyngeal being extremely rare, if occurring at all. The glosso-pharyngeal, however,

is distributed to the circumvallate papillæ. These undergo atrophy when the glosso-pharyngeal nerves are divided, and animals still retain the sense of taste, as is very plainly evident from their gestures, after section of both fifth nerves.

An interesting case has recently been reported by Rendu in the *La France Médicale*, May 11th, 1888, bearing on this question. The case was that of a man aged thirty-four, who on his admission to the hospital on June 25th, 1888, presented left facial paralysis which had existed some time, and complete deafness of the left ear, which had set in later. There was no affection of the sensibility of the face. The sense of taste was intact at the anterior part of the tongue, but impaired posteriorly. The tactile sensibility of the mouth and tongue was unimpaired except in the region of the pharynx. It is not necessary for my present object to mention the other details of the case; suffice it to say, after death, which occurred in October, a glioma was found implicating the nuclei of origin of the facial, auditory, and glosso-pharyngeal nerves. The case is, therefore a clinical confirmation of the functions ascribed to the glosso-pharyngeal in respect to gustatory sensibility.

While, however, there is practical unanimity among physiologists as to the fifth nerve being subservient to the sense of taste in the anterior

two-thirds of the tongue, there is still considerable uncertainty as to the course which these nerves take in their way to the brain. It is, however, commonly believed that the gustatory fibres do not run directly in the lingual branch of the fifth, but diverge into the chorda tympani, and thence pass through the geniculate ganglion and the greater or lesser superficial petrosal nerves, and so reach the second division and ultimately pass into the trunk of the fifth nerve.

It is said by Schiff that though taste is abolished in the anterior two-thirds of the tongue when the lingual is divided after junction with the chorda tympani, this result does not ensue when the lingual is divided *above* the point of junction. The experiments of Bernard, Lussana, Schiff, &c., would seem to show that the sense of taste is at least impaired, if not entirely abolished, when the chorda tympani alone has been divided. The occurrence of loss of taste in the anterior two-thirds of the tongue in connection with facial paralysis, assumed to be due to lesion of this nerve below, or at the geniculate ganglion, is regarded as substantiating this view, and furthermore it has been stated that irritation of the chorda tympani in disease of the ear produces a prickling or subjective gustatory sensation in the anterior two-thirds of the tongue.

It is in reference to some of these points that I

wish to bring before you some recent observations of my own.

I have recently had two cases under my care which are distinctly opposed to Schiff's view that the nerves of taste for the anterior two-thirds of the tongue run in the second division of the fifth nerve. In the case already several times referred to, the inferior division entirely recovered its functions, and with these the sense of taste in the anterior two-thirds of the tongue. The superior and middle divisions however remained, and continue till the present day, absolutely paralysed. Notwithstanding the complete block in these two divisions, however, the path of taste is completely free, showing that the gustatory fibres cannot leave the third division and reach the brain by the second or superior maxillary.

In the other case, David P., aged sixty, who had suffered for several years with severe epileptiform tic on the left side, Mr. Horsley performed Carnochan's operation, and divided the superior maxillary nerve outside the foramen rotundum, extirpating at the same time the greater portion of Meckel's ganglion. He subsequently divided the descending palatine nerve. Yet this patient, though he became anæsthetic in the region of distribution of the superior maxillary nerve, retained his sense of taste absolutely unimpaired on the left side of the tongue. Eight months

afterwards the inferior dental nerve was divided owing to a return of pain in this region. Ten months afterwards, owing to a return of the pain in the molar and orbital regions, Mr. Horsley operated again with a view to extirpate if possible the Gasserian ganglion. The foramen ovale was exposed from the zygomatic fossa, and the inferior maxillary nerve divided just outside, that is, just above the junction of the chorda tympani. It was not found possible to expose the Gasserian ganglion, but the remnant of the superior maxillary nerve which had been previously cut was further exposed and resected inside the cranial cavity. After this third operation there was complete abolition of tactile and gustatory sensibility in the anterior two-thirds of the tongue. This case may therefore be regarded as proving that the nerves of taste for the anterior two-thirds of the tongue run directly in the lingual nerve, and not in the chorda tympani. For the operation was so performed as to avoid section or obvious injury to the chorda tympani. At the present date (May 14th), *i.e.*, six months after the operation, the patient is entirely free of his neuralgia, but there is not the same absolute abolition of tactile or gustatory sensibility which occurred immediately after the operation. This, however, is only an instance of that recurrent sensibility which is known to occur even when the sensory nerve

of any particular district has been thoroughly excised. It cannot be explained on the supposition that the chorda tympani, partially damaged, had again resumed its functions, for along with the lingual the superior maxillary nerve was also extirpated, and there was a return not only of gustatory sensibility, but also of tactile sensibility in the regions formerly anæsthetic.

I have already alluded to the constitution of the chorda tympani according to Gaskell's researches. It is, as we saw, a continuation of the nerve of Wrisberg which is a rootlet distinct from the other roots of the facial, and is composed almost entirely of the smallest or visceral nerves. Gaskell states that there are a few fibres of larger dimensions mixed with these, the relations of which are uncertain; but it cannot be denied that the great bulk of the fibres of the nerve of Wrisberg, and the branches of the geniculate ganglion belong to the ganglionated efferent nerves of the splanchnic system.

It has been stated by Vulpian that the chorda tympani does not undergo degeneration after section of the seventh nerve within the skull; but this is easily explained by the fact that peripheral degeneration is stopped by the geniculate ganglion. The chorda tympani is the secretory nerve of the sub-maxillary and sub-lingual glands and is probably also the vaso-dilator nerve of the anterior

two-thirds of the tongue. Considering the small size of the chorda tympani, it seems almost an anatomical impossibility that this nerve, which undoubtedly contains a majority at least of efferent fibres, should also be equivalent to act as the nerve of special sense of such a large region as the anterior two-thirds of the tongue. And it has always appeared to me very unlikely that the nerve of special sense of the anterior two-thirds of the tongue should take such a roundabout course before reaching the brain as is involved in Schiff's hypothesis. Lussana and others believe that the fibres of the chorda tympani run directly into the nerve of Wrisberg. That the nerves of taste do not run in this nerve is proved by the fact that destruction of the facial nerve within the skull does not abolish the sense of taste in the anterior two-thirds of the tongue. Among other cases in proof of this, I would allude to that of Rendu cited above. I do not attach much importance to the prickling or obscure gustatory sensations said to have been caused by irritation of the chorda tympani in cases of disease of the middle ear. These may be purely reflex phenomena, or the result of vascular changes in the tongue.

The only facts therefore which remain in favour of the chorda tympani being the path of the gustatory fibres for the anterior two-thirds of the tongue are the frequent occurrence of loss of taste

in this region in connection with peripheral facial paralysis. How are these to be explained? I have unfortunately in a very large number of cases of this affection not specially investigated the sense of taste, but recently I have attended to this point more carefully, with the result that in cases apparently similar in their etiology, I have found quite as many, if not more, cases in which taste was absolutely unaffected as the reverse, and in those in which there has been loss of taste I have never failed to obtain evidence also of some degree of implication of the fifth nerve. The association of pronounced affection of the fifth nerve together with the seventh is by no means uncommon; but occasionally the affection of the fifth is so partial, or slight, as readily to escape observation. And I am inclined to think from the facts which I am about to lay before you, that the loss of taste in the anterior two-thirds of the tongue in connection with facial paralysis, is not due to affection of the chorda tympani, but to joint implication of the inferior division of the fifth nerve.

The following case recently came under my care at the Queen's Square Hospital, on May 25th, 1888. Elizabeth C., aged twenty-five, a somewhat anæmic, ill-nourished girl, was admitted complaining of paralysis on the right side of the face, and deafness, with discharge from the right ear, which had lasted for seven or eight months. She was also

subject to fits, and the paralysis of the right side of the face came on in one of the fits three or four weeks before admission. There was complete facial paralysis, with total abolition of faradic excitability, on the right side of the face, and total deafness in the right ear. The membrana tympani had a whitish appearance, but no perforation could be seen. There was also total loss of tactile and painful sensibility on the whole of the right side of the face below the eye, and the right side of the tongue and mucous membrane as far back as the arch of the palate. There was complete loss of taste in the anterior two-thirds of the tongue, but she could taste bitter quite distinctly on the posterior third, though the sensibility was perhaps not so acute to sweet and other sapid substances as on the other side. In this case therefore the fifth nerve was so obviously affected that the loss of taste on the anterior two-thirds of the tongue could not be ascribed to lesion of the facial nerve, though this was probably affected in the aqueduct of Fallopius.

The next case is one in which the affection of the fifth nerve was not so pronounced. Elizabeth W., aged thirty, domestic servant, consulted me on December 16th, 1888; she exhibited typical facial paralysis on the right side, which had come on fourteen days previously. There was total abolition of faradic excitability and well marked

reaction of degeneration in the paralysed muscles. Hearing was equal on both sides. The sense of taste was greatly impaired on the anterior two-thirds of the left side of the tongue. Careful investigation proved further that there was also a similar impairment of tactile sensibility on this side of the tongue. There was also decided impairment of tactile sensibility on the lower part of the cheek. The sensibility of the regions supplied by the superior and middle divisions of the fifth were unimpaired on the left side. In the course of a fortnight tactile and gustatory sensibility had entirely returned in the regions formerly affected, while the motor paralysis continued as before.

This case also shows that the loss of taste was accompanied with similar loss of tactile sensibility, altogether inexplicable by any affection of the chorda tympani pure and simple.

Case 3 illustrates the same fact:—Hyman F., aged twenty-five, consulted me on March 8th, 1889, for facial paralysis on the left side, which had come on eight days previously. The paralysis was of the well-marked peripheral type, but the faradic contractility was only slightly diminished on the paralysed side. There was well-marked loss of taste on the anterior two-thirds of the left side of the tongue. There appeared to be no loss of tactile sensibility, as the patient could indicate that he felt, and correctly localised, a

touch on the left side of the tongue. This case seemed to me to contradict my previous experience, viz.: that the loss of taste was always accompanied by loss of tactile sensibility; but on subsequent more careful investigation, I found that though there was no absolute loss of tactile sensibility, yet by careful comparison with the other side, the tactile sensibility was decidedly impaired, not only on the left half of the tongue, but also in the lower facial region, as in case 2.

Case 4.—I am obliged to my friend and former pupil, Dr. Ewens, for the particulars of the following case. Dr. Ewens had helped me in some of my investigations on this point, and therefore had his attention specially directed to the matter.

A. B., aged seventeen, consulted him in November, 1888, at the Stanhope Street Dispensary, for complete paralysis of the left side of the face, which had come on four days previously. There was no affection of the palate; hearing was normal, and there was no affection of the ear. There was loss of taste on the anterior two-thirds of the tongue. There was also slight but distinct impairment of tactile sensibility on the left side of the tongue, lower cheek and jaw. The patient recovered from his facial paralysis in less than a fortnight, and taste and tactile sensation returned somewhat later.

Case 5.—Letitia W., domestic servant, aged twenty-four, came under my care at King's College Hospital, February 25th, 1888. She stated that on the evening of the 21st she was exposed to severe cold, and on getting up the next day observed that her face was drawn. On the 25th she had a fit and became unconscious. There was a probable specific history. There was complete paralysis of all the muscles of the right side of the face, and drooping of the left eyelid. There was no difference in the electrical reactions of the two sides of the face. Though tactile sensibility was greatly impaired on the right side, forehead, cheek, side of the nose, buccal cavity, right side of the tongue, sensibility was less impaired on the lower facial region than in the upper. There was complete loss of taste in the anterior two-thirds of the tongue, and she appeared occasionally to have some doubt as to the posterior third. Hearing was diminished in the right ear. A few days after admission sensation of the face and tongue and the sense of taste had considerably improved, and on the fifth day was quite normal. A fortnight after admission the facial paralysis had diminished so that she could just close her right eye, but the deafness on the right side increased, and when examined by Dr. Pritchard was found to have complete internal ear deafness on this side. She left the hospital on the 12th of March, but

returned again on the 23rd, complaining of pains on the left side of the chest. The paralysis of the face had considerably improved, and the deafness of the right ear had passed off. In the course of a month all traces of the affection of the face had entirely disappeared. She had been treated with antispecific remedies.

The various facts which I have brought before you furnish, I think, at least a strong presumption that in cases of facial paralysis accompanied by loss of taste in the anterior two-thirds of the tongue, there will be found on careful examination some other indication of implication of the fifth nerve, and that in all probability this has escaped observation in the cases which have been put on record of apparent loss of taste altogether apart from impairment of tactile sensibility in the tongue or other region supplied by the fifth nerve.

It will probably occur to some of you to ask why the sense of taste should be ministered to by two separate nerves—the lingual and glosso-pharyngeal. The answer to this question is without doubt to be sought in the morphological relationships of the regions endowed with gustatory sensibility.

There is reason to believe that so far as taste is a somatic function and connected with the movements of the tongue in mastication, it is subserved by the fifth nerve; and in so far as it is a splanchnic

function and related to the act of deglutition that it is subserved by the glosso-pharyngeal. We may thus term the lingual, the somatic, and the glosso-pharyngeal the splanchnic nerve of taste.

Discussion.

The President: I am sure that it will be the wish of this Society that I should especially thank Dr. Ferrier for his kindness in reading his paper before us to-night. It is not an unusual circumstance for us to receive distinguished visitors whose presence is a compliment to the Society; but I am quite sure it will be your wish that I should convey to Dr. Ferrier how highly we appreciate the compliment he has paid us. He has himself done more than most living men to make a new epoch in physiological science. It is impossible to discuss the physiology of the nervous system without taking into account the new facts he has established, and the theories which those facts suggest. We are the more indebted to Dr. Ferrier because he rarely reads papers at Societies. I knew that he had an enormous amount of material, and I feel a personal obligation to him that he yielded to my solicitation.

Such a paper as we have just listened to requires to be digested, and it is not easy at once to discuss it; but I trust those members who may have questions to ask or observations to make from a pathological or clinical standpoint will not hesitate, as the time remaining at our disposal is limited.

Mr. H. Baldwin: I should like to ask Dr. Ferrier if in his opinion the sense of taste in the anterior two-thirds of the tongue is the same in quality as that in the posterior one-third. I have always been under the impression that the special sense of taste lies in the posterior one-third, and that the anterior two-thirds was only endowed with an acute degree of ordinary tactile sensation. I have frequently experimented upon my own tongue by means of galvanism,

and I have always found that galvanism of the anterior two-thirds produces only a pricking sensation, while galvanism of the posterior one-third produces always a very marked sense of taste as of some metallic salt such as chloride of zinc or nitrate of silver.

Mr. C. S. Tomes: The point in Dr. Ferrier's paper which seems to be of the greatest interest is the anatomical relation between the visceral nerves and the fifth. From time to time in our dental literature, one finds cases where pain is referred by the patient to the facial region, or, even more exactly, to the teeth. This has been attributed to some visceral lesion, and with the disappearance of the visceral lesion the neuralgia has also disappeared. I must confess that I have often thought the recorders of these cases somewhat credulous and sometimes almost gullible people, but not always so. To-day I have seen a patient who has an intense neuralgia of the fifth nerve. He is suffering from a tumour of the prostate, possibly malignant. This has increased to the extent that a supra-pubic operation is contemplated. As his prostatic symptoms have varied so in like manner has his neuralgia. There is no cause for the neuralgia to be traced in any way to the teeth, but when his other trouble has become very bad his facial neuralgia is intense. But the anatomical relation which Dr. Ferrier has shown us as to the connection between these nerves shows that it may be not only gullible people who place faith in the connection between facial neuralgia and distant sources of irritation. The case I have mentioned of course proves nothing, but is merely interesting in the light of the nervous connection which Dr. Ferrier has shown to exist.

Mr. R. H. Woodhouse: Dr. Ferrier in his paper spoke very fully and completely on the subject of the sensation of taste, but I did not catch from his remarks whether, or how far, he considered the upper palate had any connection with taste. As dentists we often find that the sense of taste is lost for a time, but is afterwards recovered. I think that

the sensation of taste is not fully developed until the tongue comes in contact with the upper palate, therefore I think that the part played by the upper palate is a question we should like an opinion upon.

Dr. Ferrier: I beg to thank you for the very kind reception which you have given my paper. The discussion this evening has shown the value of different specialists occasionally meeting and discussing some point of common interest. Many suggestions have been made which I regard as of great value in my own enquiries.

As to the sense of taste there are still many points requiring investigation. People appear to differ greatly as to the relative development of the sense of taste in different parts of the mouth. I should myself say that the anterior part of the tongue is capable of appreciating every kind of sapid substance in greater or less degree, though there is no doubt that the back of the tongue is the most sensitive. This has been regarded by Bain and other psychologists as an inducement to digestion. What are the nerves of taste for the anterior pillars of the palate and soft palate is the subject of differences of opinion. Probably they are branches of the glossopharyngeal. Mr. Tomes' remarks justify my having devoted so much of my paper to Gaskell's researches. For these appear to me to have an all-important bearing on this subject. The relation of the fifth to the visceral nerves indicated by these researches furnishes a clue to the explanation of many familiar facts otherwise obscure.

The President, having put the usual votes of thanks, which were duly honoured by the Society, announced that the next meeting would take place November 4th, when a paper would be read by Dr. Felix Semon, F.R.C.P., "On some points in the Etiology, Diagnosis, and Treatment of Empyema of the Antrum."

The Meeting was then adjourned.

[SEE OVER.]

The Hon. Treasurer requests that members who may not have received an acknowledgment of subscriptions sent by post last month (May), will kindly communicate with him.

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